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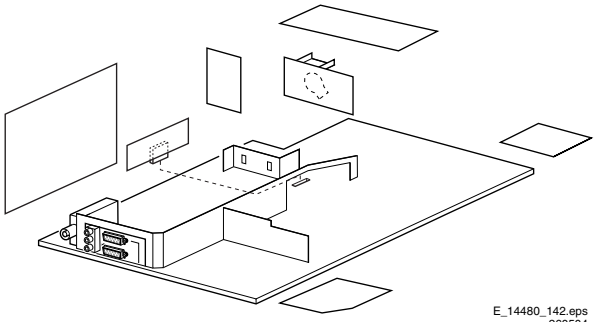

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Service Manual

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PHILIPS

1. Technical Specifications, Connections, and Chassis Overview

Index of this chapter:

Notes:

- Figures below can deviate slightly from the actual situation, due to different set executions.

1.1 Technical Specifications

1.1.1 Vision

Display type	:	CRT
Screen size	:	29” (72 cm), 4:3
Tuning system	:	PLL
Tuner bands	:	VHF
	:	UHF
	:	Hyperband
	:	S-Channel
TV Colour systems	:	PAL B/G, D/K, I
	:	SECAM
	:	SECAM B/G, D/K, L/L'
Video playback	:	NTSC
Channel selections	:	100 presets
Aerial input	:	75 ohm, Coax
	:	IEC-type

1.1.2 Sound

Sound systems	:	NICAM Stereo
Maximum power	:	2 x 5 W_rms
Features	:	Ultra bass
	:	Incredible surround

1.1.3 Miscellaneous

Power supply:		
- Mains voltage	:	220 - 240 V_ac
- Mains frequency	:	50/60 Hz
Ambient conditions:		
- Temperature range	:	+5 to +40 °C
- Maximum humidity	:	90 % R.H.
Power consumption		
- Normal operation	:	74 W (29PT5408)
	:	54 W (29PT5458)
- Standby	:	< 1 W
Dimensions (W x H x D cm)	:	771 x 699 x 594 (29PT5408)
	:	775 x 586 x 670 (29PT5458)
Weight (kg)	:	42

1.2 Connections

Note: The following connector colour abbreviations are used (acc. to DIN/IEC 757): Bk= Black, Bu= Blue, Gn= Green, Gy= Grey, Rd= Red, Wh= White, Ye= Yellow.

1.2.1 Side Connections

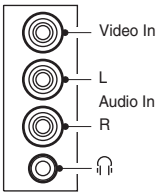

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Figure 1-1 Side I/O

Audio / Video In

Ye - Video (CVBS)	1 V_pp / 75 ohm	
Wh - Audio - L	0.5 V_rms / 10 kohm	
Rd - Audio - R	0.5 V_rms / 10 kohm	

Jack: Audio Head phone- Out

Bk - Head phone	32 - 600 ohm / 10 mW	

1.2.2 Rear Connections

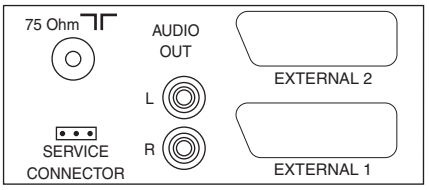

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Figure 1-2 Rear connections

Aerial In

- F-type	Coax, 75 ohm	

Cinch: Audio - Out

Rd - Audio - R	0.5 V_{RMS} / 10 kohm	
Wh - Audio - L	0.5 V_{RMS} / 10 kohm	

External 1: RGB/YUV - In and CVBS - In/Out

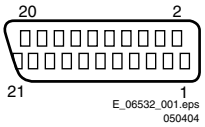

Figure 1-3 SCART connector EXT2

1	- Audio - R	0.5 V_rms / 1 kohm	⊖→
2	- Audio - R	0.5 V_rms / 10 kohm	⊕
3	- Audio - L	0.5 V_rms / 1 kohm	⊖→
4	- Audio - gnd	Ground	⏚
5	- Blue - gnd	Ground	⏚
6	- Audio - L	0.5 V_rms / 10 kohm	⊕
7	- Blue/U - in	0.7 V_pp / 75 ohm	⊕
8	- CVBS - status	0 - 2 V: INT 4.5 - 7 V: EXT 16:9 9.5 - 12 V: EXT 4:3	⊕
9	- Green - gnd	Ground	⏚
10	- n.c.		
11	- Green/Y - in	0.7 V_pp / 75 ohm	⊕
12	- n.c.		
13	- Red - gnd	Ground	⏚
14	- FBL - gnd	Ground	⏚
15	- Red/V - in	0.7 V_pp / 75 ohm	⊕
16	- Status/FBL	0 - 0.4 V: INT 1 - 3 V: EXT / 75 ohm	⊕
17	- Video	Ground	⏚
18	- Video	Ground	⏚
19	- CVBS - out	1 V_pp / 75 ohm	⊖→
20	- CVBS - in	1 V_pp / 75 ohm	⊕
21	- Shielding	Ground	⏚

External 2: CVBS- In and SVHS - In

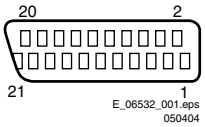

Figure 1-4 SCART connector EXT1

1	- Audio - R	0.5 V_rms / 1 kohm	⊖→
2	- Audio - R	0.5 V_rms / 10 kohm	⊕
3	- Audio - L	0.5 V_rms / 1 kohm	⊖→
4	- Audio - gnd	Ground	⏚
5	- Blue - gnd	Ground	⏚
6	- Audio - L	0.5 V_rms / 10 kohm	⊕
7	- n.c.		
8	- CVBS - status	0 - 2 V: INT 4.5 - 7 V: EXT 16:9 9.5 - 12 V: EXT 4:3	⊕
9	- Green - gnd	Ground	⏚
10	- n.c.		
11	- n.c.		
12	- n.c.		
13	- Red - gnd	Ground	⏚
14	- FBL - gnd	Ground	⏚
15	- YC-C - in	0.7 V_pp / 75 ohm	⊕
16	- n.c.		
17	- Video	Ground	⏚
18	- Video	Ground	⏚
19	- CVBS - out	1 V_pp / 75 ohm	⊖→
20	- Y/CVBS - in	1 V_pp / 75 ohm	⊕
21	- Shielding	Ground	⏚

1.3 Chassis Overview

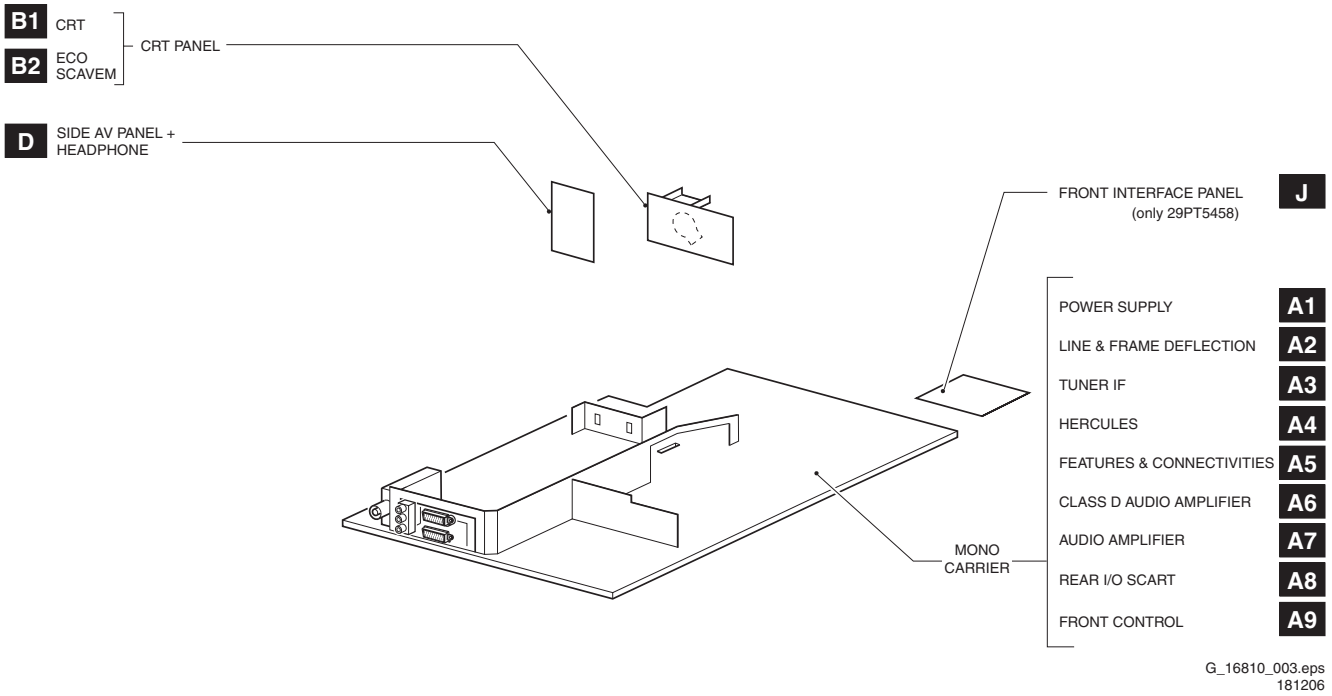

Figure 1-5 PWB location

2. Safety Instructions, Warnings, and Notes

Index of this chapter:

2.1 Safety Instructions

Safety regulations require the following **during** a repair:

- Connect the set to the Mains/AC Power via an isolation transformer (> 800 VA).
- Replace safety components, indicated by the symbol ⚠, only by components identical to the original ones. Any other component substitution (other than original type) may increase risk of fire or electrical shock hazard.
- Wear safety goggles when you replace the CRT.

Safety regulations require that **after** a repair, the set must be returned in its original condition. Pay in particular attention to the following points:

- General repair instruction: as a strict precaution, we advise you to re-solder the solder connections through which the horizontal deflection current flows. In particular this is valid for the:
  1. Pins of the line output transformer (LOT).
  2. Fly-back capacitor(s).
  3. S-correction capacitor(s).
  4. Line output transistor.
  5. Pins of the connector with wires to the deflection coil.
  6. Other components through which the deflection current flows.

Note: This re-soldering is advised to prevent bad connections due to metal fatigue in solder connections, and is therefore only necessary for television sets more than two years old.

- Route the wire trees and EHT cable correctly and secure them with the mounted cable clamps.
- Check the insulation of the Mains/AC Power lead for external damage.
- Check the strain relief of the Mains/AC Power cord for proper function, to prevent the cord from touching the CRT, hot components, or heat sinks.
- Check the electrical DC resistance between the Mains/AC Power plug and the secondary side (only for sets that have a Mains/AC Power isolated power supply):
  1. Unplug the Mains/AC Power cord and connect a wire between the two pins of the Mains/AC Power plug.
  2. Set the Mains/AC Power switch to the "on" position (keep the Mains/AC Power cord unplugged!).
  3. Measure the resistance value between the pins of the Mains/AC Power plug and the metal shielding of the tuner or the aerial connection on the set. The reading should be between 4.5 Mohm and 12 Mohm.
  4. Switch "off" the set, and remove the wire between the two pins of the Mains/AC Power plug.
- Check the cabinet for defects, to prevent touching of any inner parts by the customer.

2.2 Maintenance Instructions

We recommend a maintenance inspection carried out by qualified service personnel. The interval depends on the usage conditions:

- When a customer uses the set under normal circumstances, for example in a living room, the recommended interval is three to five years.
- When a customer uses the set in an environment with higher dust, grease, or moisture levels, for example in a kitchen, the recommended interval is one year.
- The maintenance inspection includes the following actions:
  1. Perform the “general repair instruction” noted above.
  2. Clean the power supply and deflection circuitry on the chassis.
  3. Clean the picture tube panel and the neck of the picture tube.

2.3 Warnings

- In order to prevent damage to ICs and transistors, avoid all high voltage flashovers. In order to prevent damage to the picture tube, use the method shown in figure “Discharge picture tube”, to discharge the picture tube. Use a high voltage probe and a multi-meter (position V_{DC}). Discharge until the meter reading is 0 V (after approx. 30 s).

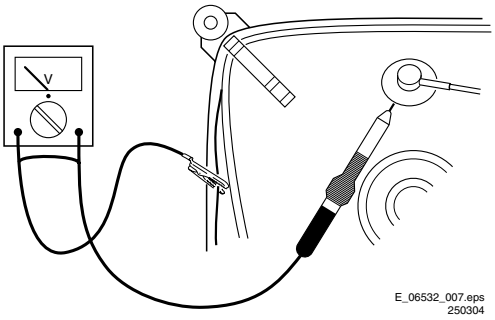

Figure 2-1 Discharge picture tube

- All ICs and many other semiconductors are susceptible to electrostatic discharges (ESD ⚠). Careless handling during repair can reduce life drastically. Make sure that, during repair, you are connected with the same potential as the mass of the set by a wristband with resistance. Keep components and tools also at this same potential. Available ESD protection equipment:
  – Complete kit ESD3 (small tablemat, wristband, connection box, extension cable and earth cable) 4822 310 10671.
  – Wristband tester 4822 344 13999.
- Be careful during measurements in the high voltage section.
- Never replace modules or other components while the unit is switched "on".
- When you align the set, use plastic rather than metal tools. This will prevent any short circuits and prevents circuits from becoming unstable.

2.4 Notes

2.4.1 General

- Measure the voltages and waveforms with regard to the chassis (= tuner) ground (⏚), or hot ground (⏚), depending on the tested area of circuitry. The voltages and waveforms shown in the diagrams are indicative. Measure them in the Service Default Mode (see chapter 5) with a colour bar signal and stereo sound (L: 3 kHz, R: 1 kHz unless stated otherwise) and picture carrier at 475.25 MHz for PAL, or 61.25 MHz for NTSC (channel 3).
- Where necessary, measure the waveforms and voltages with (⊓) and without (⊼) aerial signal. Measure the voltages in the power supply section both in normal operation (⏻) and in stand-by (⏻). These values are indicated by means of the appropriate symbols.
- The semiconductors indicated in the circuit diagram and in the parts lists, are interchangeable per position with the

semiconductors in the unit, irrespective of the type indication on these semiconductors.
- Manufactured under license from Dolby Laboratories. “Dolby”, “Pro Logic” and the “double-D symbol”, are trademarks of Dolby Laboratories.

2.4.2 Schematic Notes

- All resistor values are in ohms, and the value multiplier is often used to indicate the decimal point location (e.g. 2K2 indicates 2.2 kohm).
- Resistor values with no multiplier may be indicated with either an "E" or an "R" (e.g. 220E or 220R indicates 220 ohm).
- All capacitor values are given in micro-farads (μ= x10^{-6}), nano-farads (n= x10^{-9}), or pico-farads (p= x10^{-12}).
- Capacitor values may also use the value multiplier as the decimal point indication (e.g. 2p2 indicates 2.2 pF).
- An "asterisk" (*) indicates component usage varies. Refer to the diversity tables for the correct values.
- The correct component values are listed in the Spare Parts List. Therefore, always check this list when there is any doubt.

2.4.3 Rework on BGA (Ball Grid Array) ICs

General
Although (LF)BGA assembly yields are very high, there may still be a requirement for component rework. By rework, we mean the process of removing the component from the PWB and replacing it with a new component. If an (LF)BGA is removed from a PWB, the solder balls of the component are deformed drastically so the removed (LF)BGA has to be discarded.

Device Removal
As is the case with any component that is being removed, it is essential when removing an (LF)BGA, that the board, tracks, solder lands, or surrounding components are not damaged. To remove an (LF)BGA, the board must be uniformly heated to a temperature close to the reflow soldering temperature. A uniform temperature reduces the risk of warping the PWB. To do this, we recommend that the board is heated until it is certain that all the joints are molten. Then carefully pull the component off the board with a vacuum nozzle. For the appropriate temperature profiles, see the IC data sheet.

Area Preparation
When the component has been removed, the vacant IC area must be cleaned before replacing the (LF)BGA.
Removing an IC often leaves varying amounts of solder on the mounting lands. This excessive solder can be removed with either a solder sucker or solder wick. The remaining flux can be removed with a brush and cleaning agent.
After the board is properly cleaned and inspected, apply flux on the solder lands and on the connection balls of the (LF)BGA.
Note: Do not apply solder paste, as this has been shown to result in problems during re-soldering.

Device Replacement
The last step in the repair process is to solder the new component on the board. Ideally, the (LF)BGA should be aligned under a microscope or magnifying glass. If this is not possible, try to align the (LF)BGA with any board markers. So as not to damage neighbouring components, it may be necessary to reduce some temperatures and times.

More Information
For more information on how to handle BGA devices, visit this URL: *www.atyourservice.ce.philips.com* (needs subscription, not available for all regions). After login, select “Magazine”, then go to “Repair downloads”. Here you will find Information on how to deal with BGA-ICs.

2.4.4 Lead-free Solder

Philips CE is producing lead-free sets (PBF) from 1.1.2005 onwards.

Identification: The bottom line of a type plate gives a 14-digit serial number. Digits 5 and 6 refer to the production year, digits 7 and 8 refer to production week (in example below it is 1991 week 18).

Figure 2-2 Serial number example

Regardless of the special lead-free logo (which is not always indicated), one must treat all sets from this date onwards according to the rules as described below.

Figure 2-3 Lead-free logo

Due to lead-free technology some rules have to be respected by the workshop during a repair:
- Use only lead-free soldering tin Philips SAC305 with order code 0622 149 00106. If lead-free solder paste is required, please contact the manufacturer of your soldering equipment. In general, use of solder paste within workshops should be avoided because paste is not easy to store and to handle.
- Use only adequate solder tools applicable for lead-free soldering tin. The solder tool must be able:
  - To reach a solder-tip temperature of at least 400°C.
  - To stabilise the adjusted temperature at the solder-tip.
  - To exchange solder-tips for different applications.
- Adjust your solder tool so that a temperature of around 360°C - 380°C is reached and stabilised at the solder joint. Heating time of the solder-joint should not exceed ~ 4 sec. Avoid temperatures above 400°C, otherwise wear-out of tips will increase drastically and flux-fluid will be destroyed. To avoid wear-out of tips, switch “off” unused equipment or reduce heat.
- Mix of lead-free soldering tin/parts with leaded soldering tin/parts is possible but PHILIPS recommends strongly **to avoid** mixed regimes. If this cannot be avoided, carefully clean the solder-joint from old tin and re-solder with new tin.
- Use only original spare-parts listed in the Service-Manuals. Not listed standard material (commodities) has to be purchased at external companies.
- Special information for lead-free BGA ICs: these ICs will be delivered in so-called "dry-packaging" to protect the IC against moisture. This packaging may only be opened shortly before it is used (soldered). Otherwise the body of the IC gets "wet" inside and during the heating time the structure of the IC will be destroyed due to high (steam-) pressure inside the body. If the packaging was opened before usage, the IC has to be heated up for some hours (around 90°C) for drying (think of ESD-protection!).
  Do not re-use BGAs at all!
- For sets produced before 1.1.2005, containing leaded soldering tin and components, all needed spare parts will be available till the end of the service period. For the repair of such sets nothing changes.

In case of doubt whether the board is lead-free or not (or with mixed technologies), you can use the following method:

- Always use the highest temperature to solder, when using SAC305 (see also instructions below).
- De-solder thoroughly (clean solder joints to avoid mix of two alloys).

Caution: For BGA-ICs, you **must** use the correct temperature-profile, which is coupled to the 12NC. For an overview of these profiles, visit the website *www.atyourservice.ce.philips.com* (needs subscription, but is not available for all regions)
You will find this and more technical information within the "Magazine", chapter "Repair downloads".
For additional questions please contact your local repair help desk.

2.4.5 Alternative BOM identification

In September 2003, Philips CE introduced a change in the way the serial number (or production number, see Figure 2-2) is composed. From this date on, the **third digit** in the serial number (example: AG**2**B0335000001) indicates the number of the alternative BOM (Bill of Materials used for producing the specific model of TV set). It is possible that the same TV model on the market is produced with e.g. two different types of displays, coming from two different O.E.M.s.
By looking at the third digit of the serial number, the service technician can see if there is more than one type of B.O.M. used in the production of the TV set he is working with. He can then consult the At Your Service Web site, where he can type in the Commercial Type Version Number of the TV set (e.g. 28PW9515/12), after which a screen will appear that gives information about the number of alternative B.O.M.s used.
If the third digit of the serial number contains the number 1 (example: AG**1**B033500001), then there is only one B.O.M. version of the TV set on the market. If the third digit is a 2 (example: AG**2**B0335000001), then there are two different B.O.M.s. Information about this is important for ordering the correct spare parts!
For the third digit, the numbers 1...9 and the characters A...Z can be used, so in total: 9 plus 26 = 35 different B.O.M.s can be indicated by the third digit of the serial number.

2.4.6 Practical Service Precautions

- **It makes sense to avoid exposure to electrical shock.** While some sources are expected to have a possible dangerous impact, others of quite high potential are of limited current and are sometimes held in less regard.
- **Always respect voltages**. While some may not be dangerous in themselves, they can cause unexpected reactions that are best avoided. Before reaching into a powered TV set, it is best to test the high voltage insulation. It is easy to do, and is a good service precaution.

3. Directions for Use

You can download this information from the following websites:
http://www.philips.com/support
http://www.p4c.philips.com

4. Mechanical Instructions

Index of this chapter:

Notes:

- Figures below can deviate slightly from the actual situation, due to different set executions.
- Make sure that both the ComPair connector and the UART connector are shielded off with a piece of insulating tape after repair for ESD reasons. Place this tape over the holes in the rear cover of the set.

4.1 Set Disassembly

Warning: Be sure to disconnect the AC power from the set before opening it.

4.1.1 Rear Cover

1. Remove all fixation screws of the rear cover (do not forget the screws that hold the rear connection panel).
2. Pull the rear cover backwards to remove it.

4.2 Service Position

Before placing the Mono Carrier in its service position, remove the Front Interface assy/panel (see paragraph “Front Interface Assy/Panel removal”), the Side AV assy/panel (see paragraph “Side AV Assy/Panel removal”) and the PIP assy/panel (if exists) (see paragraph “PIP Assy/Panel removal”).

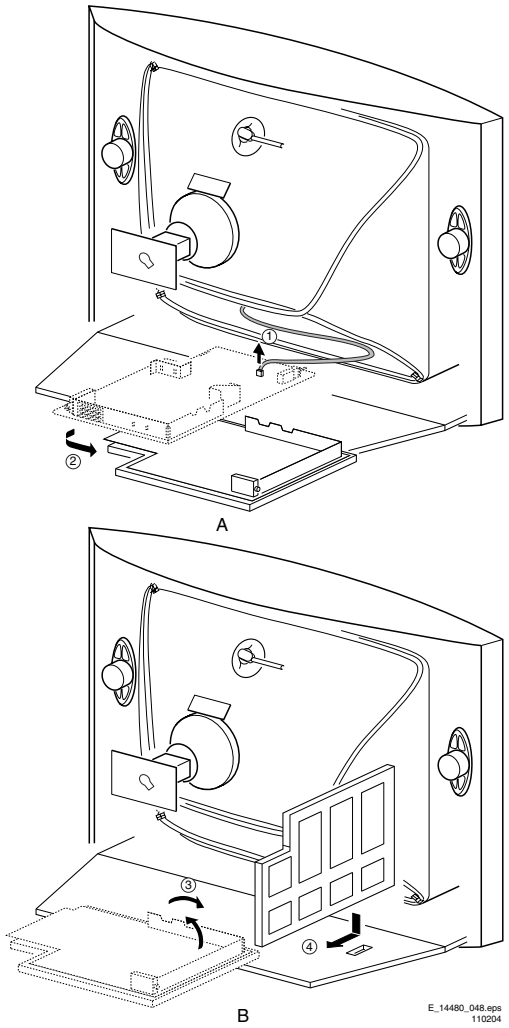

Figure 4-1 Service position Mono Carrier

1. Disconnect the degaussing coil [1].
2. Release the two fixation clamps (at the mid left and mid right side of the bracket), and remove the bracket from the bottom tray, by pulling it backwards [2].
3. Turn the chassis tray 90 degrees counter clockwise.
4. Move the panel bracket somewhat to the left and flip it 90 degrees [3], with the components towards the CRT.
5. Turn the panel bracket with the rear I/O toward the CRT.
6. Place the hook of the tray in the fixation hole of the cabinet bottom [4] and secure it.

4.3 Assies/Panels Removal

4.3.1 Front Interface Assy/Panel Removal

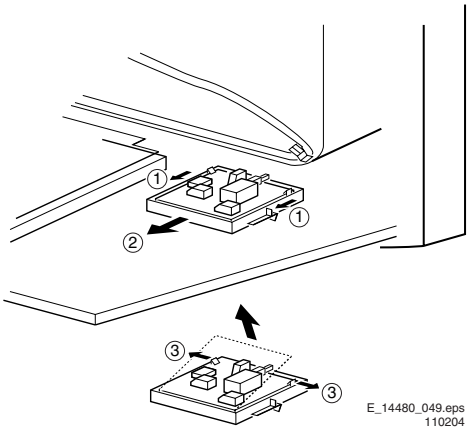

Figure 4-2 Front interface assy/panel removal

1. Remove the complete module from the bottom plate, by pulling the two fixation clamps upward [1], while sliding the module away from the CRT [2].
   Note: these clamps are difficult to access.
2. Release the two fixation clamps [3] at the side of the bracket, and lift the panel out of the bracket (it hinges at one side).

4.3.2 Side AV Assy/Panel Removal

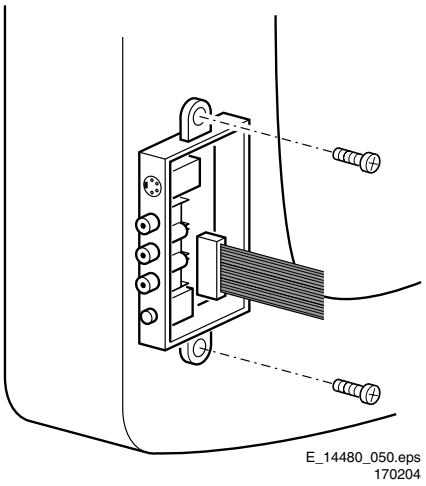

Figure 4-3 Side AV assy/panel removal

1. Remove the two fixation screws, and remove the complete Side AV assembly.
2. Release the two fixation clamps, and lift the panel out of the bracket.

4.4 Set Re-assembly

To re-assemble the whole set, do all processes in reverse order.

Note: before you mount the rear cover, perform the following checks:

1. Check whether the AC power cord is mounted correctly in its guiding brackets.
2. Check whether all cables are replaced in their original position

5. Service Modes, Error Codes, and Fault Finding

Index of this chapter:

5.1 Test Points

The chassis is equipped with test points printed on the circuit board assemblies. These test points refer to the functional blocks:

Table 5-1 Test point overview

Test point	Circuit	Diagram
F508, F535, F536, F537, F552, F561, F563, F573, F664,I513, I518, I519, I524, I531, I533, I546	Power supply	A1
F401, F412, F413, F414, F418, F452, F453, F455, F456, F458, F459, F460, F461, I408, I416, I417, I420, I462, I468	Line + Frame Deflection	A2
F003, F004, I001, I002	Tuner IF	A3
F201, F203, F205, F206	Hercules	A4
F240, F241, F242	Features & Connectivity	A5
F952, F955, I951, I952	Audio Amplifier	A7
F692	Front Control	A9
F331, F332, F333, F338, F339, F341, F351, F353, F354	CRT Panel	B1
F361, F362, F381, F382	ECO Scavem	B2

Perform measurements under the following conditions:
- Television set in Service Default Alignment Mode.
- Video input: Colour bar signal.
- Audio input: 3 kHz left channel, 1 kHz right channel.

5.2 Service Modes

Service Default mode (SDM) & Service Alignment Mode (SAM) offers several features for the service technician, while the Customer Service Mode (CSM) is used for communication between the call centre and the customer.

This chassis also offers the option of using ComPair, a hardware interface between a computer and the TV chassis. It offers the abilities of structured troubleshooting, error code reading, and software version read-out for all these chassis. *Minimum requirements for ComPair:* a Pentium processor, a Windows OS, and a CD-ROM drive (see "ComPair" section).

Table 5-2 Software cluster overview

SW Cluster	SW Version	First Mask	Remarks
L6LKEF7_3.1	L04EF7 3.1	TDA12020H1/N1F90	Europe

5.2.1 Service Default Mode (SDM)

Purpose
- To create a predefined setting for measurements to be made.
- To override software protections.
- To start the blinking LED procedure.

Specifications
- Tuning frequency: 475.25 MHz.
- Colour system: PAL/SECAM.
- All picture settings at 50 % (brightness, colour contrast, hue).
- Bass, treble and balance at 50 %; volume at 25 %.
- All service-unfriendly modes (if present) are disabled. The service unfriendly modes are:
  - Timer / Sleep timer.
  - Child / parental lock.
  - Blue mute.
  - Hotel / hospital mode.
  - Auto shut OFF (when no 'IDENT' video signal is received for 15 minutes).
  - Skipping of non-favourite presets / channels.
  - Auto-storage of personal presets.
  - Auto user menu time-out.
  - Auto Volume Levelling (AVL).

How to Enter

To enter SDM, use one of the following methods:
- Press the following key sequence on the remote control transmitter: **'0 6 2 5 9 6'** directly followed by the **'MENU'** button (do not allow the display to time out between entries while keying the sequence).
- Short jumper wires 9252 and 9275 on the family board (see Fig. 8-1) and apply mains. Then press the power button (remove the short after start-up).
  Caution: Entering SDM by shorting wires 9252 and 9275 will override the +8V-protection. Do this only for a short period. When doing this, the service-technician must know exactly what he is doing, as it could damage the television set.
- Or via ComPair (with the ComPair 'Tools', it should be possible to enter SDM via the ComPair interface).

After entering SDM, the following screen is visible, with SDM in the upper right corner of the screen to indicate that the television is in Service Default Alignment Mode.

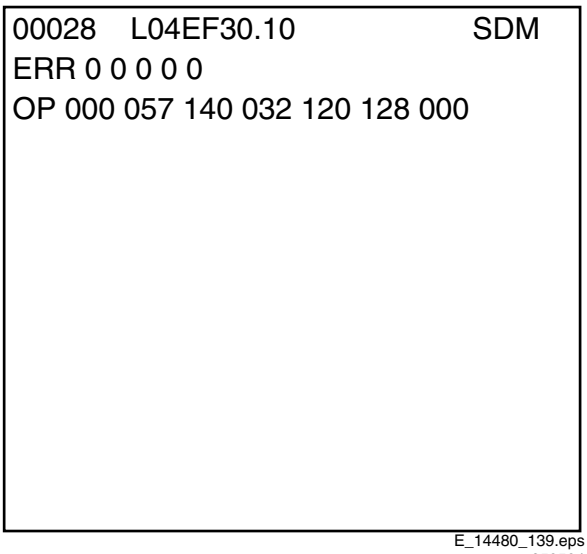

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Figure 5-1 SDM menu

How to Navigate

Use one of the following methods:

- When you press the MENU button on the remote control, the set will switch on the normal user menu in the SDM mode.
- On the TV, press and hold the 'VOLUME down' and press the 'CHANNEL down' for a few seconds, to switch from SDM to SAM and reverse.

How to Exit

Switch the set to STANDBY by pressing the POWER button on the remote control transmitter or the television set.
If you turn the television set OFF by removing the Mains (i.e., unplugging the television) without using the POWER button, the television set will remain in SDM when mains is re-applied, and the error buffer is not cleared.

5.2.2 Service Alignment Mode (SAM)

Purpose

- To change option settings.
- To display / clear the error code buffer.
- To perform alignments.

Specifications

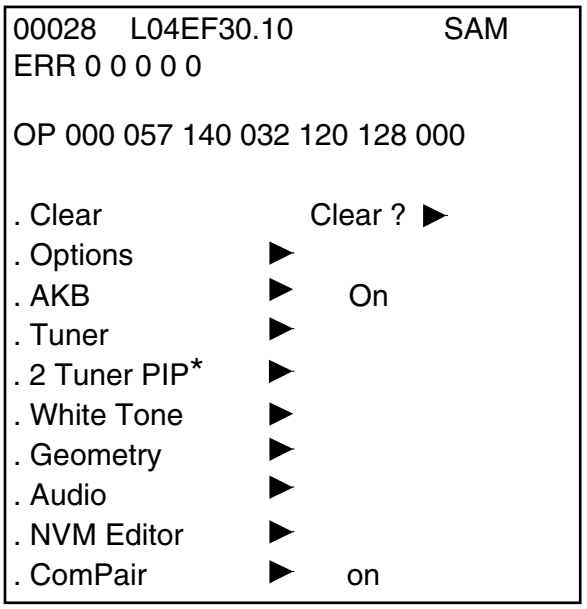
- Run timer (maximum five digits displayed)
- Software version, Error & Option Bytes display
- Clear error buffer.
- Option settings
- AKB switching
- Software alignments (Tuner, 2 Tuner PIP, White Tone, Geometry & Audio)
- NVM Editor
- ComPair Mode switching

How to Enter

To enter SAM, use one of the following methods:

- Press the following key sequence on the remote control transmitter: **'0 6 2 5 9 6'** directly followed by the “On Screen Display icon “i +” button (do not allow the display to time out between entries while keying the sequence).
- Or via ComPair.

After entering SAM, the following screen is visible, with SAM in the upper right corner of the screen to indicate that the television is in Service Alignment Mode.



* optional

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Figure 5-2 SAM menu

Menu Explanation

1. **LLLLL.** This represents the run timer. The run timer counts normal operation hours, but does not count standby hours (maximum four digits displayed).
2. **AAABCD-X.Y.** This is the software identification of the main microprocessor:
   - **A** = the project name (L04).
   - **B** = the region: E= Europe, A= Asia Pacific, U= NAFTA, L= LATAM.
   - **C** = the software diversity:
     - **Europe:** T = 1 page TXT, F = Full TXT, V = Voice control.
     - **LATAM and NAFTA:** N = Stereo non-dBx, S = Stereo dBx.
     - **Asian Pacific:** F = Full TXT, N = non TXT, C = NTSC.
     - **ALL regions:** M = mono, D = DVD, Q = Mk2.
   - **D** = the language cluster number.
   - **X** = the main software version number (updated with a major change that is incompatible with previous versions).
   - **Y** = the sub software version number (updated with a minor change that is compatible with previous versions).
3. **SAM.** Indication of the Service Alignment Mode.
4. **Error Buffer.** Shows all errors detected since the last time the buffer was erased. Five errors possible.
5. **Option Bytes.** Used to set the option bytes. See 'Options' in the Alignments section for a detailed description. Seven codes are possible.
6. **Clear.** Erases the contents of the error buffer. Select the CLEAR menu item and press the MENU RIGHT key. The content of the error buffer is cleared.
7. **Options.** Used to set the option bits. See 'Options' in the Alignments section for a detailed description.
8. **AKB.** Used to disable (OFF) or enable (ON) the 'black current loop' (AKB = Auto Kine Bias).
9. **Tuner.** Used to align the tuner. See 'Tuner' in the Alignments section for a detailed description.
10. **2 Tuner PIP.** Used to align the tuner PIP (optional)
11. **White Tone.** Used to align the white tone. See 'White Tone' in the Alignments section for a detailed description.
12. **Geometry.** Used to align the geometry settings of the television. See 'Geometry' in the Alignments section for a detailed description.

13. **Audio.** No audio alignment is necessary for this television set.
14. **NVM Editor. Used to change the NVM data in the television set.**
15. **ComPair Mode. Used to switch ON the television to ISP mode (for uploading software)**

How to Navigate
- In SAM, select menu items with the MENU UP/DOWN keys on the remote control transmitter. The selected item will be highlighted. When not all menu items fit on the screen, use the MENU UP/DOWN keys to display the next / previous menu items.
- With the MENU LEFT/RIGHT keys, it is possible to:
  – Activate the selected menu item.
  – Change the value of the selected menu item.
  – Activate the selected submenu.
- In SAM, when you press the MENU button twice, the set will switch to the normal user menus (with the SAM mode still active in the background). To return to the SAM menu press the MENU or STATUS/EXIT button.
- When you press the MENU key in while in an SDAM submenu, you will return to the previous menu.

How to Store SAM Settings
To store settings changed in SAM leave the top level SAM menu by using the POWER button on the remote control transmitter or the television set.

How to Exit
Switch the set to STANDBY by pressing the POWER button on the remote control transmitter or the television set.
If you turn the television set OFF by removing the mains (i.e., unplugging the television) without using the POWER button, the television set will remain in SAM when mains is re-applied, and the error buffer is not cleared.

5.2.3 Customer Service Mode (CSM)

Purpose
The Customer Service Mode shows error codes and information on the TV operation settings. The call centre can instruct the customer to enter CSM by telephone and read out the information displayed. This helps the call centre to diagnose problems and failures in the TV set before making a service call.
The CSM is a read-only mode; therefore, modifications are not possible in this mode.

How to Enter
To enter CSM, press the following key sequence on the remote control transmitter: '**1 2 3 6 5 4**' (do not allow the display to time out between entries while keying the sequence).

Upon entering the Customer Service Mode, the following screen will appear:

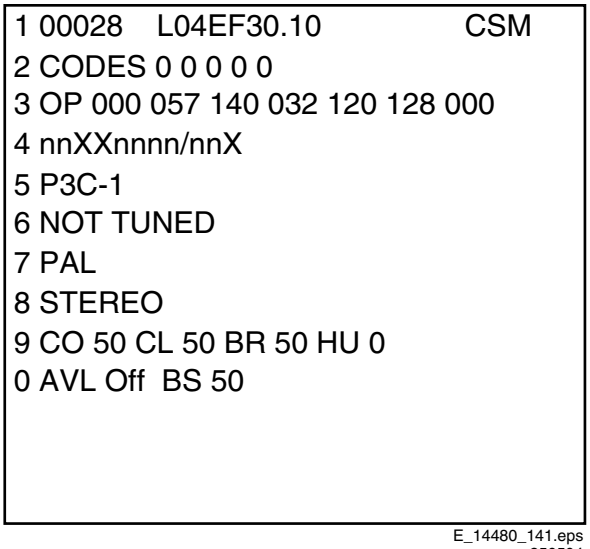

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Figure 5-3 CSM menu

Menu Explanation
1. Indication of the service mode (CSM = Customer Service Mode).
2. Reserved item.
3. Software identification of the main microprocessor (see 'Service Default Alignment Mode' for an explanation)
4. Reserved item for P3C call centres (AKBS stands for Advanced Knowledge Base System).
5. Indicates the type of TV system or whether or not the television is receiving an 'IDENT' signal on the selected source. If no 'IDENT' signal is detected, the display will read 'NOT TUNED'
6. Displays the last five errors detected in the error code buffer.

How to Exit
To exit CSM, use one of the following methods:
- Press the MENU, STATUS/EXIT, or POWER button on the remote control transmitter.
- Press the POWER button on the television set.

5.3 Problems and Solving Tips Related to CSM

5.3.1 Picture Problems

Note: The problems described below are all related to the TV settings. The procedures used to change the value (or status) of the different settings are described.

Picture too Dark or too Bright
If:
- The picture improves when you press the AUTO PICTURE button on the remote control transmitter, or
- The picture improves when you enter the Customer Service Mode

Then:
1. Press the AUTO PICTURE button on the remote control transmitter repeatedly (if necessary) to choose PERSONAL picture mode.
2. Press the MENU button on the remote control transmitter. This brings up the normal user menu.
3. In the normal user menu, use the MENU UP/DOWN keys to highlight the PICTURE sub menu (if necessary).
4. Press the MENU LEFT/RIGHT keys to enter the PICTURE sub menu.

5. Use the MENU UP/DOWN keys (if necessary) to select BRIGHTNESS.
6. Press the MENU LEFT/RIGHT keys to increase or decrease the BRIGHTNESS value.
7. Use the MENU UP/DOWN keys to select PICTURE.
8. Press the MENU LEFT/RIGHT keys to increase or decrease the PICTURE value.
9. Press the MENU button on the remote control transmitter twice to exit the user menu.
10. The new PERSONAL preference values are automatically stored.

White Line around Picture Elements and Text

If:
The picture improves after you have pressed the AUTO PICTURE button on the remote control transmitter

Then:
1. Press the AUTO PICTURE button on the remote control transmitter repeatedly (if necessary) to choose PERSONAL picture mode.
2. Press the MENU button on the remote control transmitter. This brings up the normal user menu.
3. In the normal user menu, use the MENU UP/DOWN keys to highlight the PICTURE sub menu (if necessary).
4. Press the MENU LEFT/RIGHT keys to enter the PICTURE sub menu.
5. Use the MENU UP/DOWN keys to select SHARPNESS.
6. Press the MENU LEFT key to decrease the SHARPNESS value.
7. Press the MENU button on the remote control transmitter twice to exit the user menu.
8. The new PERSONAL preference value is automatically stored.

Snowy Picture

To enter CSM, press the following key sequence on the remote control transmitter: '**123654'** (do not allow the display to time out between entries while keying the sequence).

Check CSM line 5. If this line reads 'Not Tuned,' check the following:
- Antenna not connected. Connect the antenna.
- No antenna signal or bad antenna signal. Connect a proper antenna signal.
- The tuner is faulty (in this case line 6, the Error Buffer line, will contain error number 10). Check the tuner and replace/ repair the tuner if necessary.

Black and White Picture

If:
- The picture improves after you have pressed the AUTO PICTURE button on the remote control transmitter

Then:
1. Press the AUTO PICTURE button on the remote control transmitter repeatedly (if necessary) to choose PERSONAL picture mode.
2. Press the MENU button on the remote control transmitter. This brings up the normal user menu.
3. In the normal user menu, use the MENU UP/DOWN keys to highlight the PICTURE sub menu (if necessary).
4. Press the MENU LEFT/RIGHT keys to enter the PICTURE sub menu.
5. Use the MENU UP/DOWN keys to select COLOR.
6. Press the MENU RIGHT key to increase the COLOR value.
7. Press the MENU button on the remote control transmitter twice to exit the user menu.
8. The new PERSONAL preference value is automatically stored.

Menu Text not Sharp Enough

If:
- The picture improves after you have pressed the AUTO PICTURE button on the remote control transmitter.

Then:
1. Press the AUTO PICTURE button on the remote control transmitter repeatedly (if necessary) to choose PERSONAL picture mode.
2. Press the MENU button on the remote control transmitter. This brings up the normal user menu.
3. In the normal user menu, use the MENU UP/DOWN keys to highlight the PICTURE sub menu (if necessary).
4. Press the MENU LEFT/RIGHT keys to enter the PICTURE sub menu.
5. Use the MENU UP/DOWN keys to select PICTURE.
6. Press the MENU LEFT key to decrease the PICTURE value.
7. Press the MENU button on the remote control transmitter twice to exit the user menu.
8. The new PERSONAL preference value is automatically stored.

5.4 ComPair

Note:
Make sure that both the ComPair connector and the UART connector are shielded off with a piece of insulating tape after repair for ESD reasons. Place this tape over the holes in the rear cover of the set.

5.4.1 Introduction

ComPair (Computer Aided Repair) is a service tool for Philips Consumer Electronics products. ComPair is a further development on the European DST (service remote control), which allows faster and more accurate diagnostics. ComPair has three big advantages:
- ComPair helps you to quickly get an understanding on how to repair the chassis in a short time by guiding you systematically through the repair procedures.
- ComPair allows very detailed diagnostics (on I2C level) and is therefore capable of accurately indicating problem areas. You do not have to know anything about I2C commands yourself because ComPair takes care of this.
- ComPair speeds up the repair time since it can automatically communicate with the chassis (when the microprocessor is working) and all repair information is directly available. When ComPair is installed together with the SearchMan electronic manual of the defective chassis, schematics and PWBs are only a mouse click away.

5.4.2 Specifications

ComPair consists of a Windows based fault finding program and an interface box between PC and the (defective) product. The ComPair interface box is connected to the PC via a serial or RS232 cable.
In this chassis, the ComPair interface box and the TV communicate via a bi-directional service cable via the service connector.

The ComPair fault finding program is able to determine the problem of the defective television. ComPair can gather diagnostic information in two ways:
- **Automatic** (by communication with the television): ComPair can automatically read out the contents of the entire error buffer. Diagnosis is done on I2C level. ComPair can access the I2C bus of the television. ComPair can send and receive I2C commands to the micro controller of the television. In this way, it is possible for ComPair to communicate (read and write) to devices on the I2C busses of the TV-set.

- **Manually** (by asking questions to you): Automatic diagnosis is only possible if the micro controller of the television is working correctly and only to a certain extend. When this is not the case, ComPair will guide you through the fault finding tree by asking you questions (e.g. *Does the screen give a picture? Click on the correct answer: YES / NO*) and showing you examples (e.g. *Measure test-point I7 and click on the correct waveform you see on the oscilloscope*). You can answer by clicking on a link (e.g. text or a waveform picture) that will bring you to the next step in the fault finding process.

By a combination of automatic diagnostics and an interactive question / answer procedure, ComPair will enable you to find most problems in a fast and effective way.

Beside fault finding, ComPair provides some **additional features** like:
- Up- or downloading of pre-sets.
- Managing of pre-set lists.
- Emulation of the Dealer Service Tool (DST).
- If both ComPair and SearchMan (Electronic Service Manual) are installed, all the schematics and the PWBs of the set are available by clicking on the appropriate hyperlink. **Example**: *Measure the DC-voltage on capacitor C2568 (Schematic/Panel) at the Mono-carrier*.
  - Click on the 'Panel' hyperlink to automatically show the PWB with a highlighted capacitor C2568.
  - Click on the 'Schematic' hyperlink to automatically show the position of the highlighted capacitor.

5.4.3 How to Connect ComPair

1. First, install the ComPair Browser software (see the Quick Reference Card for installation instructions).
2. Connect the RS232 interface cable between a free serial (COM) port of your PC and the PC connector (marked with 'PC') of the ComPair interface.
3. Connect the mains adapter to the supply connector (marked with 'POWER 9V DC') of the ComPair interface.
4. Switch the ComPair interface “OFF”.
5. Switch the television set “OFF” with the mains switch.
6. Connect the ComPair interface cable between the connector on the rear side of the ComPair interface (marked with 'I2C') and the ComPair (or *Service*) connector at the rear side of the TV (for its location see figure 8-1 in chapter “Alignments”).
7. Plug the mains adapter in a mains outlet, and switch the interface “ON”. The green and red LEDs light up together. The red LED extinguishes after approx. 1 second while the green LED remains lit.
8. Start the ComPair program and read the 'Introduction' chapter.

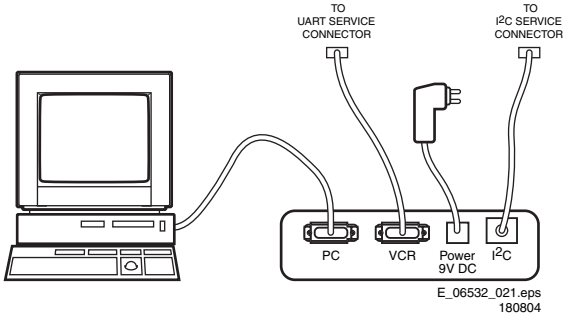

Figure 5-4 ComPair connection

5.4.4 How to Order

ComPair order codes:
- Starter kit ComPair32/SearchMan32 software and ComPair interface (excl. transformer): 3122 785 90450.
- ComPair interface (excluding transformer): 4822 727 21631.
- Starter kit ComPair32 software (registration version): 3122 785 60040.
- Starter kit SearchMan32 software: 3122 785 60050.
- ComPair32 CD (update): 3122 785 60070 (year 2002, 3122 785 60110 (year 2003).
- SearchMan32 CD (update): 3122 785 60080 (year 2002), 3122 785 60120 (year 2003).
- ComPair interface cable: 3122 785 90004.
- Transformer (non-UK): 4822 727 21632.
- Transformer UK: 4822 727 21633.

Note: If you encounter any problems, contact your local support desk.

5.5 Error Codes

The error code buffer contains all errors detected since the last time the buffer was erased. The buffer is written from left to right. When an error occurs that is not yet in the error code buffer, it is displayed at the left side and all other errors shift one position to the right.

5.5.1 How to Read the Error Buffer

You can read the error buffer in 3 ways:
- On screen via the SDAM (if you have a picture).
  Examples:
  - ERROR: 0 0 0 0 0 : No errors detected
  - ERROR: 6 0 0 0 0 : Error code 6 is the last and only detected error
  - ERROR: 9 6 0 0 0 : Error code 6 was detected first and error code 9 is the last detected (newest) error
- Via the blinking LED procedure (when you have no picture). See 'The Blinking LED Procedure'.
- Via ComPair.

5.5.2 How to Clear the Error Buffer

The error code buffer is cleared in the following cases:
- By using the CLEAR command in the SDAM menu:
  - To enter SAM, press the following key sequence on the remote control transmitter: '062596' directly followed by the “OSD" icon button (do not allow the display to time out between entries while keying the sequence).
  - Make sure the menu item CLEAR is highlighted. Use the MENU UP/DOWN buttons, if necessary.
  - Press the MENU RIGHT button to clear the error buffer. The text on the right side of the 'CLEAR' line will change from 'CLEAR?' to 'CLEARED'
- If the contents of the error buffer have not changed for 50 hours, the error buffer resets automatically.

Note: If you exit SAM by disconnecting the Mains from the television set, the error buffer is not reset.

5.5.3 Error Codes

In case of non-intermittent faults, write down the errors present in the error buffer and clear the error buffer before you begin the repair. This ensures that old error codes are no longer present.
If possible, check the entire contents of the error buffer. In some situations, an error code is only the result of another error and not the actual cause of the problem (for example, a fault in the protection detection circuitry can also lead to a protection).

Table 5-3 Error codes overview

Error	Device	Error description	Check item	Diagram
0	Not applicable	No Error		
1	Not applicable	X-Ray / over-voltage protection (US only)	2411, 2412, 2413, 6404, 6411, 6412.	A2
2	Not applicable	High beam (BCI) protection	3404, 7405	A2
3	Not applicable	Vertical guard protection	3466, 7451, 7452, 7453, 7454	A2
4	Tuner UA1316/A	I2C error while communicating with 2nd tuner	1000, 5010 (PIP Module)	F2
5	Not applicable	+5v protection	7604, 7605	A5
6	I2C bus	General I2C error	7200, 3207, 3214	A4
7	Not applicable	-	-	-
8	Not applicable	-	-	-
9	24C16	I2C error while communicating with the EEPROM	7601, 3604, 3605	A5
10	Tuner	= I2C error while communicating with the PLL tuner	1000, 5001	A3
11	TDA6107/A	Black current loop instability protection	7330, 3351, CRT	B1
12	SDA9488X	I2C error while communicating with the PIP processor	7242 (PIP Module)	F1
13	Not applicable	-	-	-
14	DVD Loader	I2C error while communicating with the DVD Interface module	DVD Interface module	DVD Loader
15	TDA9178T/N1	I2C error while communicating with LTI module	7610	H
16	TDA9887	I2C error while communicating with PIP_Demodulator	7201	F2
17	Not applicable	-	-	-
18	Not applicable	-	-	-
19	TDA1200	I2C error while communicating with SSD stereo sound decoder	7200	A4
20	TDA1200	I2C error while communicating with video cosmic in Hercules IC	7200	A4

Note: Errors 7, 8, 13, 17, 18 are not applicable.

5.6 The Blinking LED Procedure

Using this procedure, you can make the contents of the error buffer visible via the front LED. This is especially useful when there is no picture.

When the SDM is entered, the LED will blink the contents of the error-buffer:
- When all the error-codes are displayed, the sequence finishes with an **'ON'** LED blink of 1.5 seconds,
- The sequence starts again.

Example of error buffer: **12 9 6 0 0**
After entering SDM, the following occurs:
- 1 long 'ON' blink of 5 seconds to start the sequence,
- 12 short blinks followed by a pause of 1.5 seconds,
- 9 short blinks followed by a pause of 1.5 seconds,
- 6 short blinks followed by a pause of 1.5 seconds,
- 1 long 'ON' blink of 1.5 seconds to finish the sequence,
- The sequence starts again at 12 short blinks.

5.7 Protections

If a fault situation is detected, an error code will be generated; and, if necessary, the television set will go into protection mode. Blinking of the red LED at a frequency of 3 Hz indicates the protection mode. In some error cases, the microprocessor does not put the set in protection mode. The error codes of the error buffer and the blinking LED procedure can be read via the Service Default Menu (SDM), or via ComPair.
To get a quick diagnosis the chassis has three service modes implemented:
- The Customer Service Mode (CSM).
- The Service Default Mode (SDM).
- The Service Alignment Mode (SAM).

For a detailed description, see the "Customer Service Mode, Service Default mode" and "Service Alignment Mode" sections.

5.8 Fault Finding and Repair Tips

Notes:
- It is assumed that the components are mounted correctly with correct values and no bad solder joints.
- Before any fault finding actions, check if the correct options are set.

5.8.1 NVM Editor

In some cases, it can be handy if one directly can change the NVM contents. This can be done with the “NVM Editor” in SAM mode. In the next table, the default NVM values are given.

Table 5-4 NVM default values

Model		29PT5408	29PT5458
Parameter	**Addr. (dec)**	**Value (hex)**	
EW (EW width)	19	25	25
PW (EW parabola width)	20	0A	0A
HS (Horizontal shift)	21	1A	1A
HP (Horizontal parallelogram)	22	1F	1F
HB (Horizontal Bow)	23	1F	1F
UCP (EW upper corner parabola)	24	1E	1E
LCP (EW lower corner parabola)	25	28	28
TC (EW trapezium)	26	1A	1A
VS (Vertical slope)	27	25	25
VA (Vertical amplitude)	28	1E	1E
SC (S-Correction)	29	14	14
VSH (Vertical Shift)	30	1A	1A
VX (Vertical Zoom)	31	19	19
VSL (Vertical scroll)	32	20	20
VL (Vertical linearity)	33	20	20
AGC (AGC Takeover)	36	17	17
OIF (IF-PLL Offset)	37	20	20
AGC10 (AGC 10)	38	01	01
H60 (60 Hz Horizontal Shift)	39	09	09
PWL (Peaking Frequency, Soft Clipper, Peak White Limit)	40	07	07
COR_ON_OFF (SECAM_PAL)	41	0F	0F
60 Hz Vertical amplitude	42	40	40
CL	43	07	07
RGB amplitude for full teletext mode	46	14	14
NVM_TABLE_VERSION	60	31	31
OPTION_TABLE_VERSION	61	13	13
NVM_RGB_BLOR	62	23	23
NVM_RGB_BLOG	63	24	24
TXT Brightness	64	0F	0F
V60 offset (60Hz Vertical Amplitude)	66	FE	FE
FOAB, CHSE	139	03	03
SPR, WS	140	00	00
VMA, SVM	141	32	32
SOC_SMD	142	03	03
CCC_Preset_Gain_Red	143	1F	1F
CCC_Preset_Gain_Green	144	1F	1F
CCC_Preset_Gain_Blue	145	1F	1F
NVM_FMWS	149	02	02
NVM_ASD_SC1_THR	150	10	10
NVM_CRYSTAL_ALIGN	208	31	31
Last Brightness (VID PP others)	264	TBF	TBF
Last Color (VID PP others)	265	TBF	TBF
Last Contrast (VID PP others)	266	TBF	TBF
Last Sharpness (VID PP others)	267	TBF	TBF
Last Hue (VID PP others)	268	TBF	TBF
Last Colour Temperature (VID PP others)	269	TBF	TBF
White-D Cool Red	294	FD	FD
White-D Cool Blue	296	8	8
White-D Normal Red	297	22	22
White-D Normal Green	298	20	20
White-D Normal Blue	299	1E	1E
White-D Warm Red	300	03	03
White-D Warm Blue	302	F9	F9
Last Volume	343	14	14
Last Balance	344	32	32
Last Treble (AUD PP others)	345	37	37
Last Bass (AUD PP others)	346	28	1E

5.8.2 Power Supply

Set Not Working

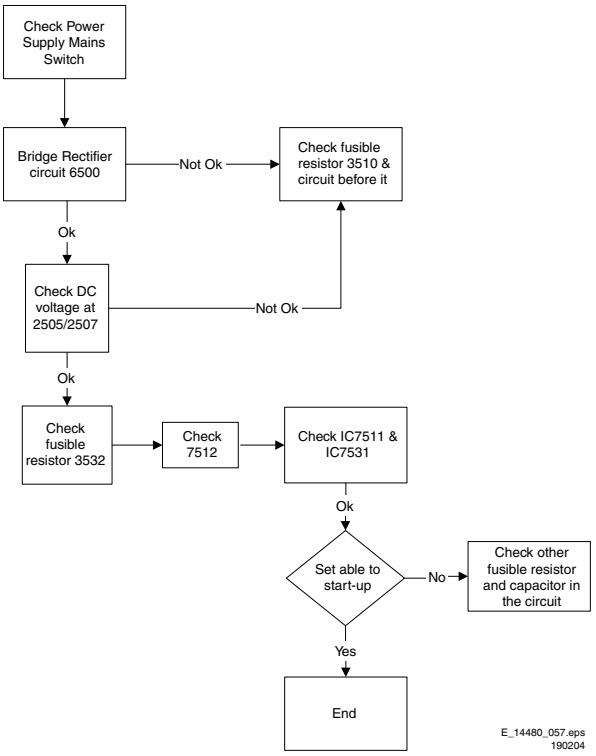

Figure 5-5 Fault finding tree "Set not working"

Set Does Not Start Up

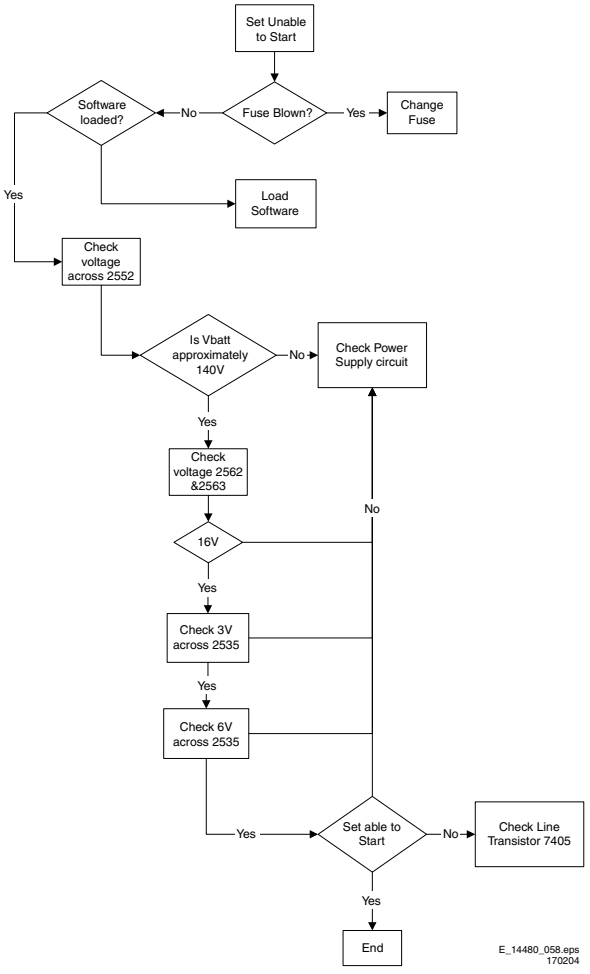

Figure 5-6 Fault finding tree "Set does not start up"

5.8.3 Deflection

One Thin Vertical Line

Quick check:

- Set in protection mode.
- LED blinking with error “3”.

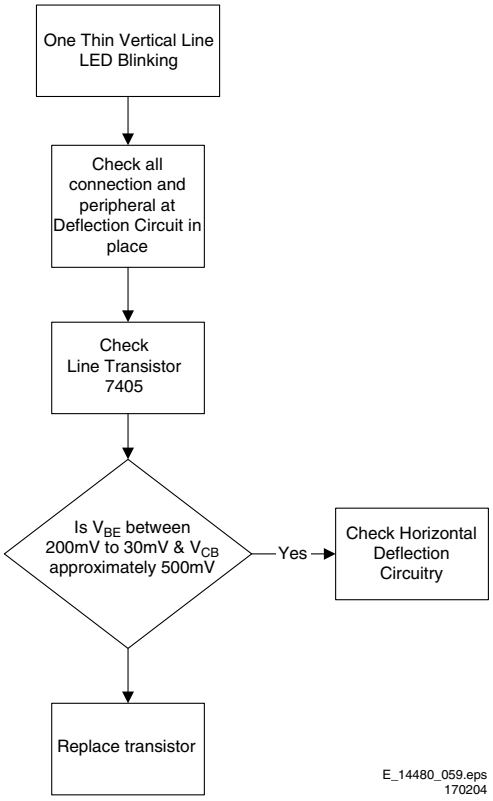

Figure 5-7 Fault finding tree “One thin vertical line”

One Thin Horizontal Line

Quick check:

- Set in protection mode.
- LED blinking with error “2”.

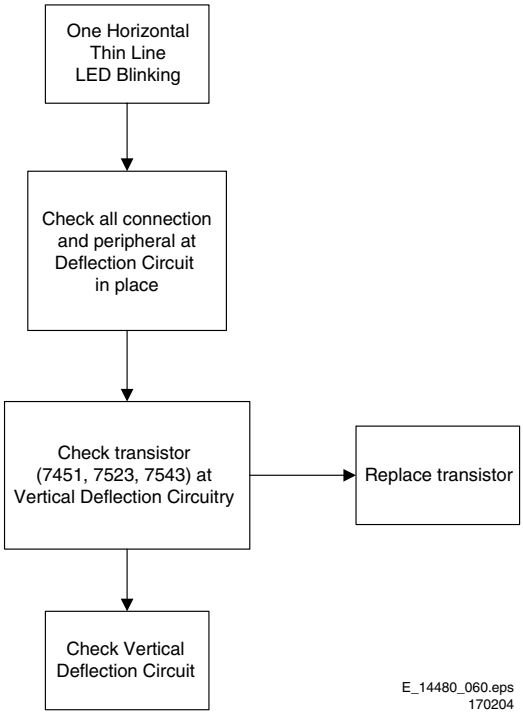

Figure 5-8 Fault finding tree “One thin horizontal line”

Blank Screen

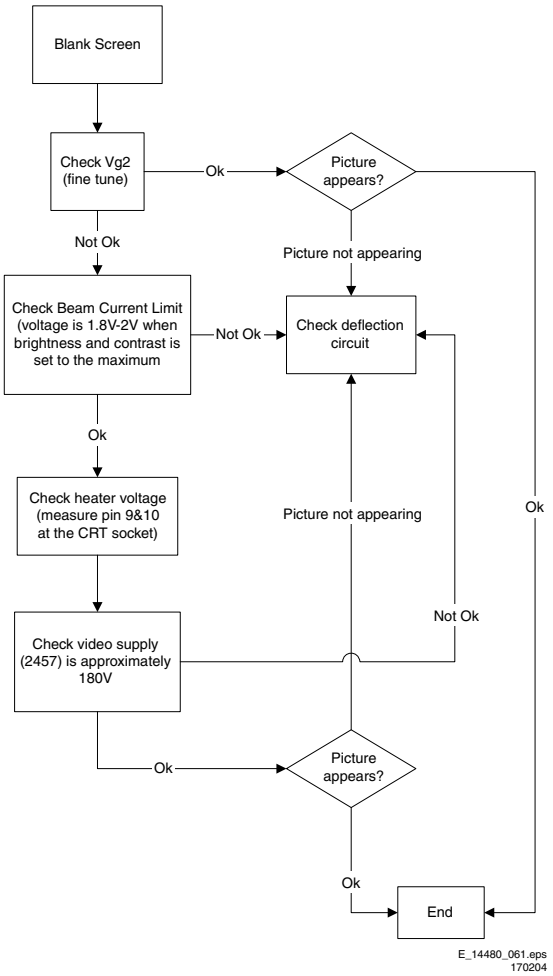

Figure 5-9 Fault finding tree “Blank screen”

5.8.4 Source Selection

Set is not able to go into AV or any missing AV is encountered

E.g. AV1 is available but not able to enter to AV1: Check if the option setting is correct.

Set is able to go to AV, but no audio is heard.

1. Check that continuity of signal is there from the SCART/ Cinch input to the input of the Hercules.
2. If continuity is there and still no audio, check that option settings are correct.
3. If logic setting is correct and still no audio, proceed to Audio Decoder/Processor troubleshooting section.

Set is able to go into AV but no video is available:

1. Check continuity from AV input to HERCULES depending on the input.
2. If continuity is available and yet no video, proceed to Video Processor troubleshooting section.

5.8.5 Tuner and IF

No Picture

1. Check that the Option settings are correct.
2. If correct, check that supply voltages are there.
3. If supply voltages are present, check whether picture is present in AV.
4. If picture is present in AV, check with the scope the Tuner IF output signal by manual storage to a known channel.

5. If IF output is present, Tuner is working fine. If no IF output, I2C data lines may be open, check continuity of I2C lines. If I2C lines are o.k., Tuner may be defect, replace Tuner.
6. If Tuner IF is present and yet still no picture in RF mode, go to Video Processing troubleshooting section.

No Picture, No Sound

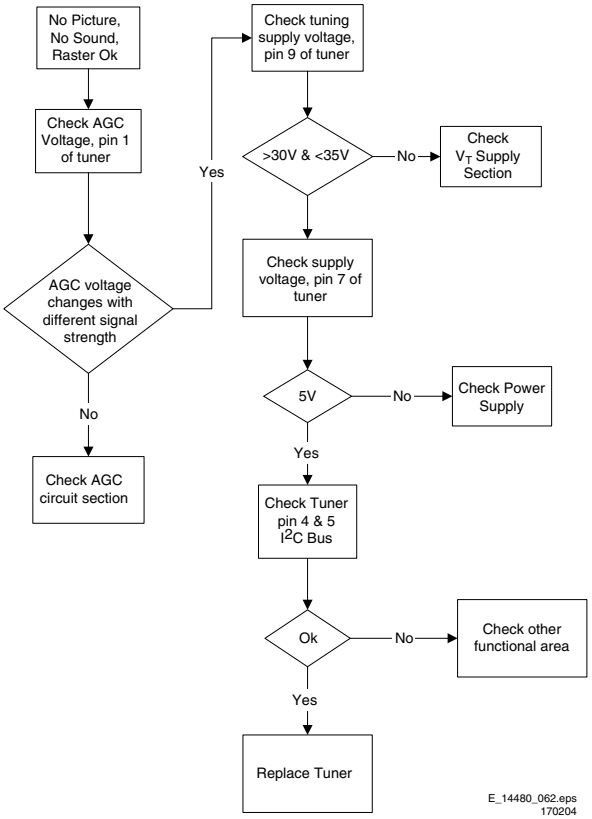

Figure 5-10 Fault finding tree "No picture, no sound"

Picture o.k., No Sound

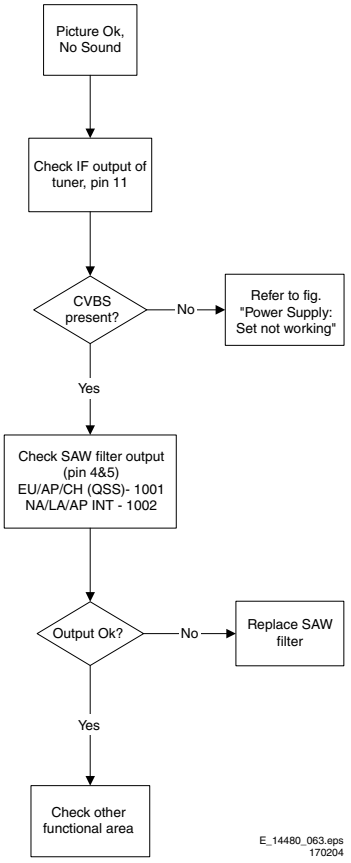

Figure 5-11 Fault finding tree "Picture o.k., no sound"

Unable To Perform Tuning

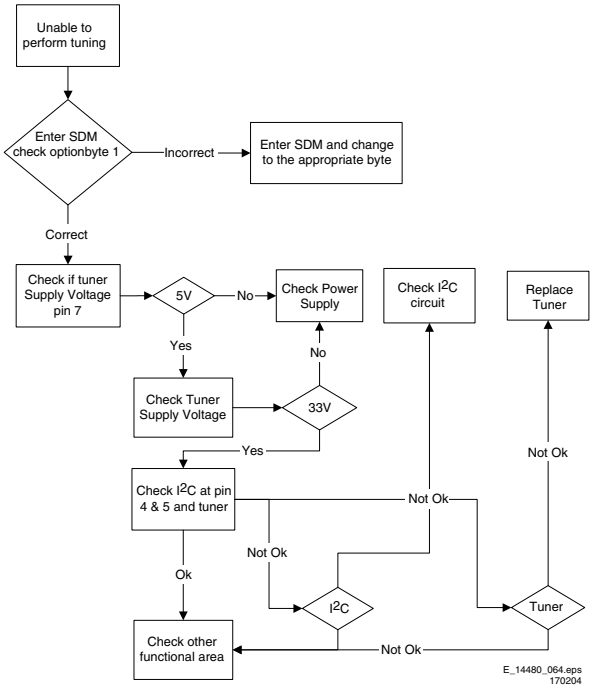

Figure 5-12 Fault finding tree "Unable to perform tuning"

5.8.6 Controller

Below are some guidelines for troubleshooting of the Micro Controller function. Normally Micro Controller should be checked when there is a problem of start-up.

1. Check that both +3.3 V_dc and +1.8 V_dc are present.
2. Check that crystal oscillator is working.

3. Check that Power Good signal is at “high” logic, normal operation.
4. Check that HERCULES is not in standby mode. Pin 15 of HERCULES should be 0 V_dc.
5. Make sure H-drive pulse is there. This can be checked at resistor R3239. If H-drive does not exist, remove resistor R3239 to check if there is loading.

Note: When the set shuts down after a few second after power “ON”, the main cause is that Vg2 not aligned properly, try adjusting Vg2 during the few seconds of power “ON”.

5.8.7 Video Processing

No Picture

When “no picture in RF”, first check if the microprocessor is functioning o.k. in section “Controller”. If that is o.k., follow the next steps.
When “no picture in AV”, first check if the video source selection is functioning o.k. in section “Source Selection”. If that is o.k., follow the next steps.

1. Check that normal operating conditions are met.
2. Check that there is video signal at pin 81. If no video, demodulator part of the HERCULES is faulty, replace with new HERCULES.
3. If video signal is available at pin 81, check pin 56, 57, and 58 for the RGB signal.
4. If signal is not available, try checking the BRIGHTNESS and/or CONTRAST control, and make sure it is not at zero.
5. If still with the correct settings and no video is available, proceed to the CRT/RGB amplifier diagram.

For sets with TDA9178, follow steps below:
1. Put Option Byte 2 bit 4 to “0”; if video signal is not available, then check fault finding section “Controller”, Section “Source Selection”, and steps above.
2. If video is available but not correct, put Option Byte 2 bit 4 to “1”, then check if LTI panel is present. If not, put LTI panel in the main chassis (connector 1221).
3. If LTI panel is in main chassis, check cable between LTI panel and main chassis (position is 1206). If it is connected, then the LTI panel is faulty, replace it.

For sets with Scavem, and Scavem does not work, follow steps below:
1. Check Scavem coil connector (position is 1361) if connected; if not, connect it.
2. If connected, check NVM “bit storage” byte 1 bit 7; if it is not “1”, set it to “1”.
3. If it is “1”, then check the data of the NVM addresses as in the next table. If the data is not correct, then set these addresses to diagram values.
4. If it still not works, track Scavem output from pin 64 of HERCULES to CRT panel.

Table 5-5 NVM default values for Scavem

Description	Address (dec)	Address (hex)	Value (hex)
SPR, WS	140	8C	00
VMA, SVM	141	8D	32
NVM_SOC_SMD	142	8E	03

5.8.8 Audio Processing

No Sound

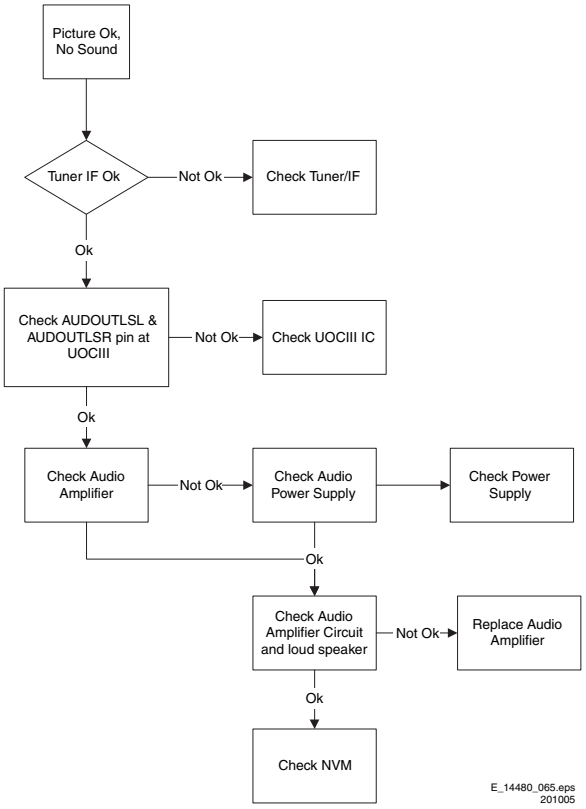

Figure 5-13 Fault finding tree “No sound”

No RF audio for QSS/Inter-Carrier stereo sets.
1. Check pin 99 and 100 for SIF signal (for QSS) or pin 104 and 105 for video with SIF (for Inter-Carrier)
2. If signal is not present, check for the QSS/FMI bit settings. Check also the NVM data.
3. If signals are present and still no audio, check the audio supply voltage +8V are present.
4. If still no audio signal at Hercules output, Hercules is faulty.

No AV audio.
1. Check troubleshooting methods in section “Source Selection”.
2. Check the output of the Hercules to see if there is signal available. If no, check the normal operating condition and also the NVM data.
3. If still no audio signal at Hercules output, Hercules is faulty.

Note: If there is audio signal at Hercules output and no audio at loudspeaker, proceed to Audio Amplifier troubleshooting methods.

5.8.9 Audio Amplifier

No RF nor AV audio at the loudspeaker:
1. Check that the normal operation condition of the amplifier is met.
2. If normal operation conditions are met, check the continuity from Hercules output to input of the amplifier.
3. If continuity is there and still no audio, check speaker wire connections. If still no audio, amplifier IC might be faulty.

Personal Notes:

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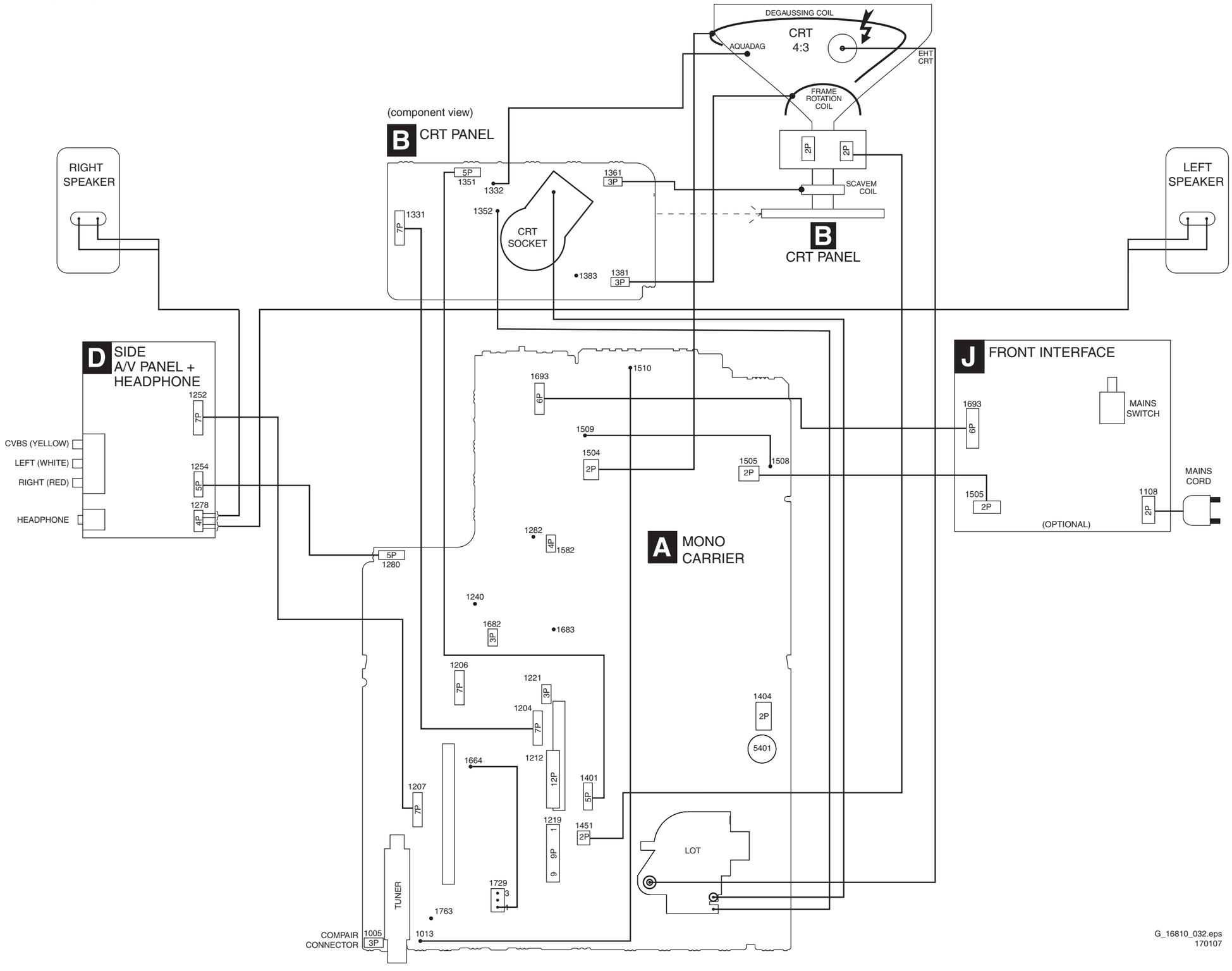
6. Block Diagrams, Test Point Overviews, and Waveforms

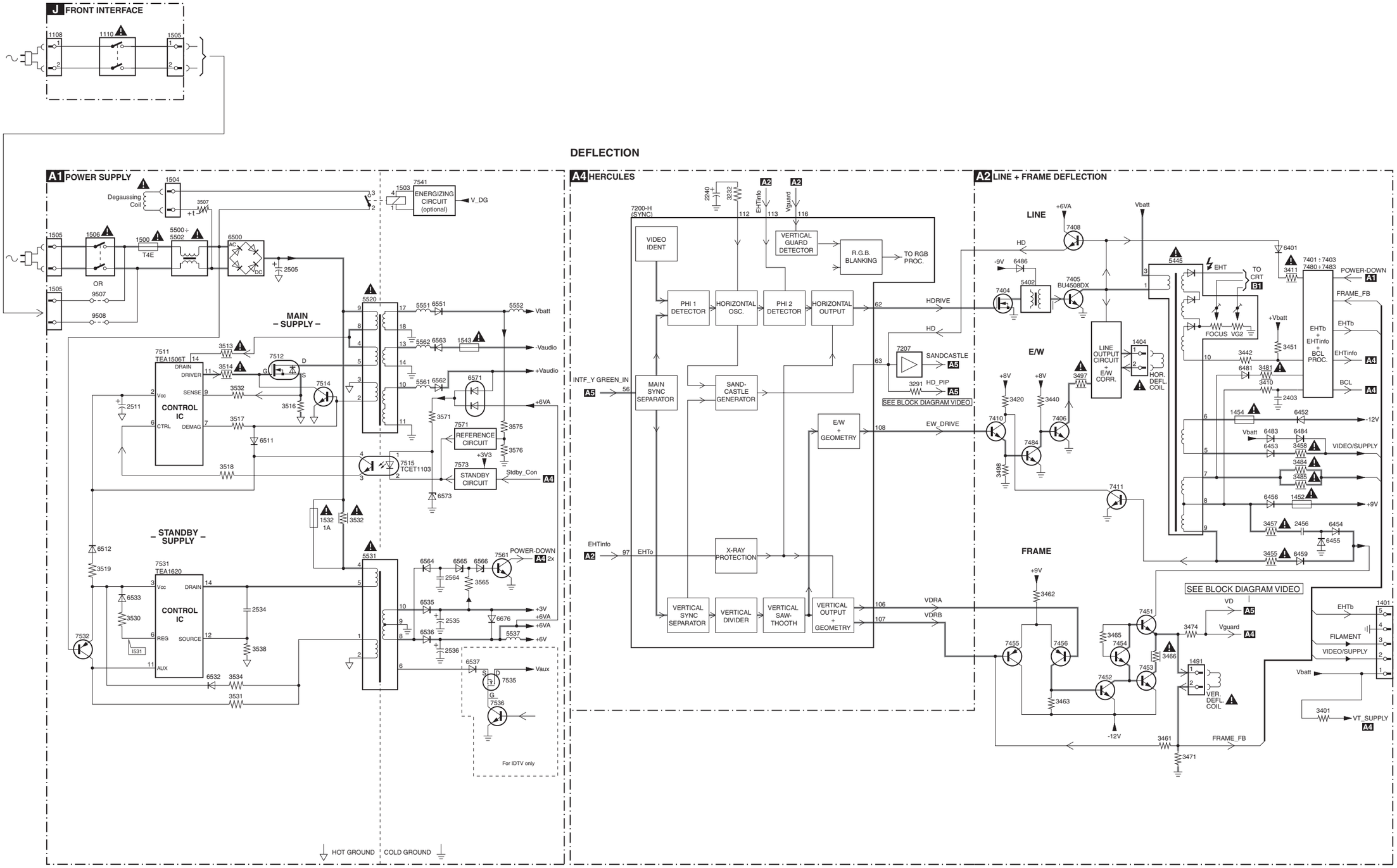
Wiring Diagram



Block Diagram Supply and Deflection

SUPPLY

DEFLECTION



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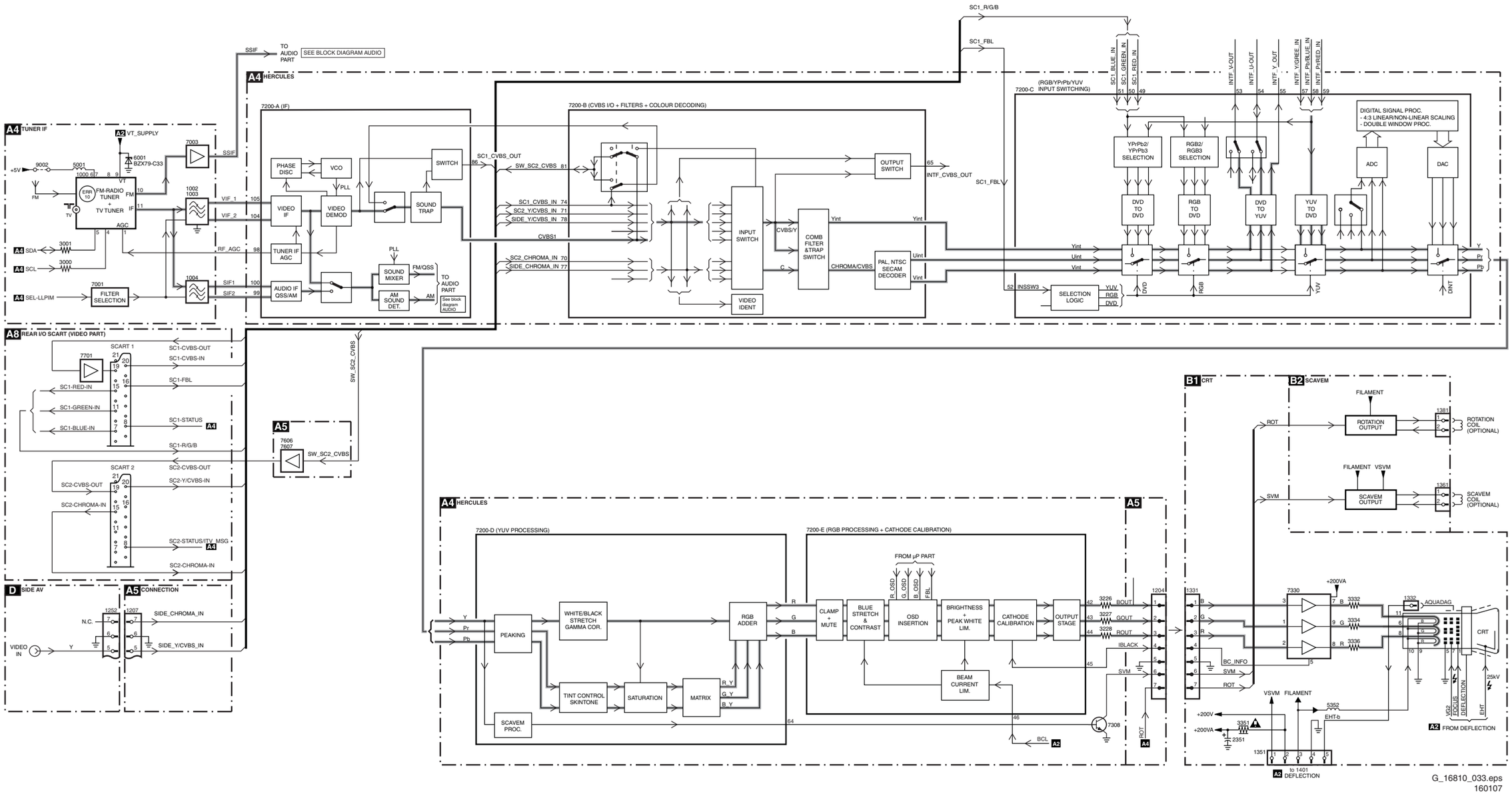
Block Diagram Video

VIDEO



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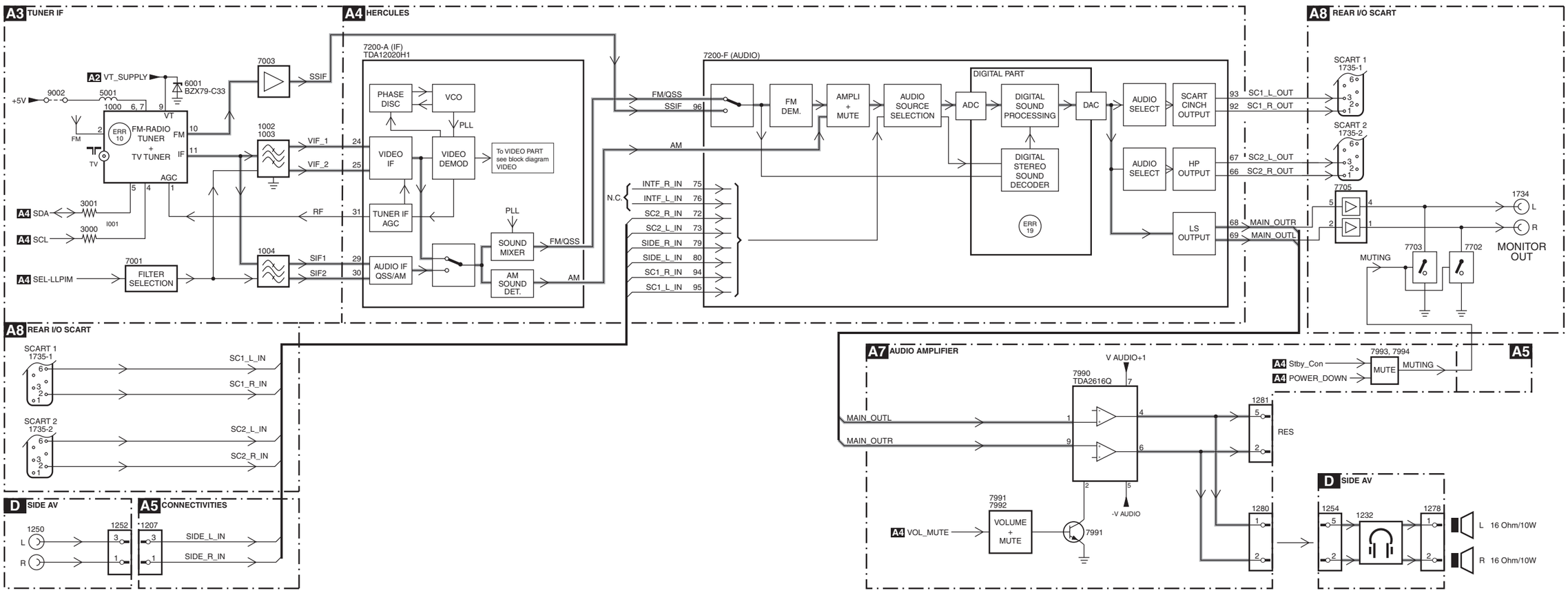
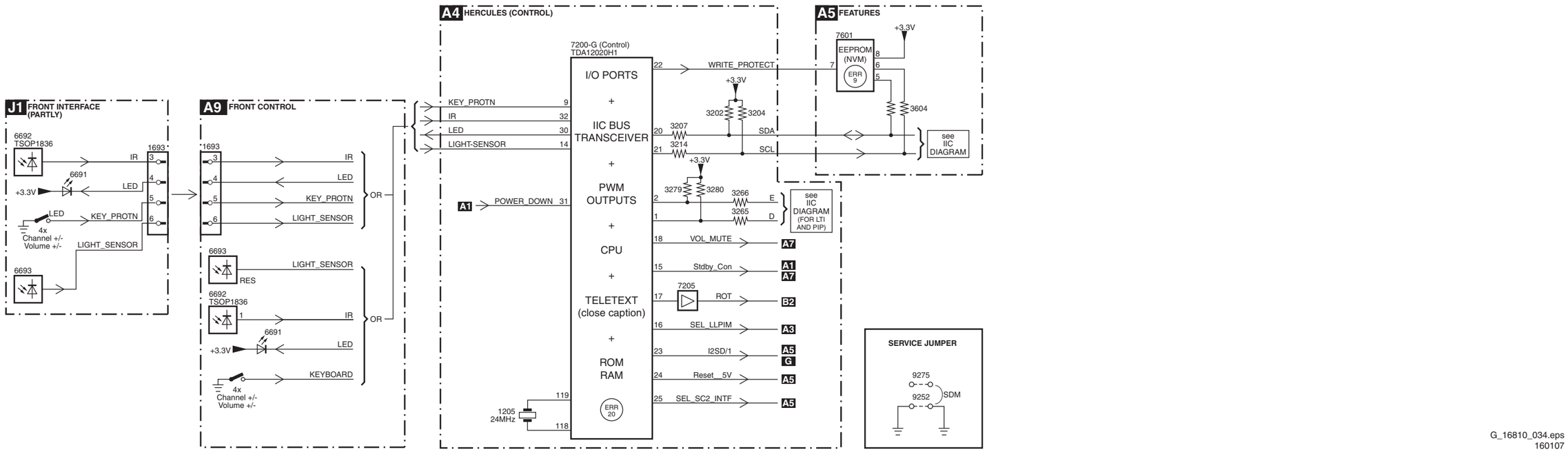
Block Diagram Audio/Control

AUDIO



CONTROL



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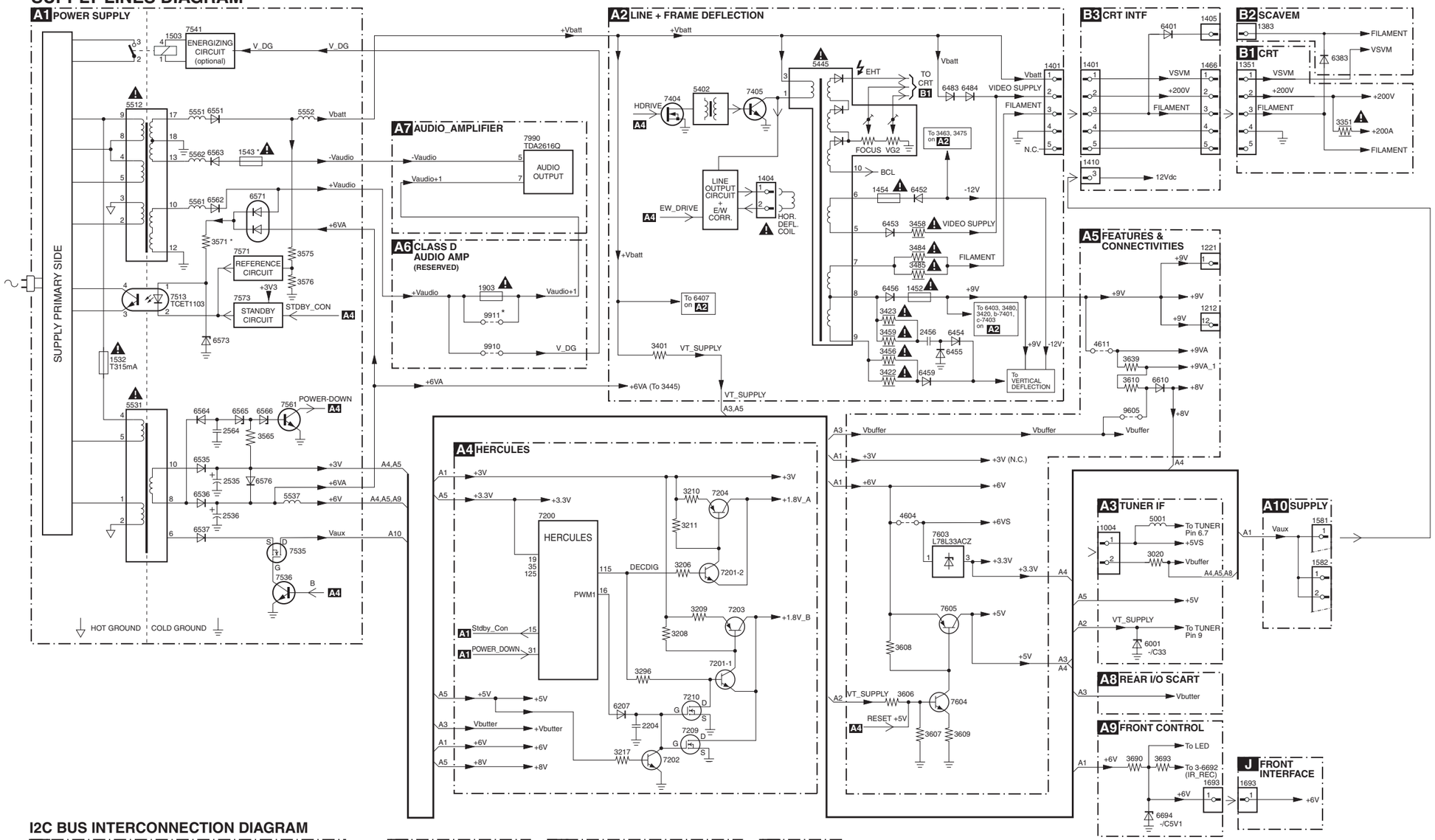
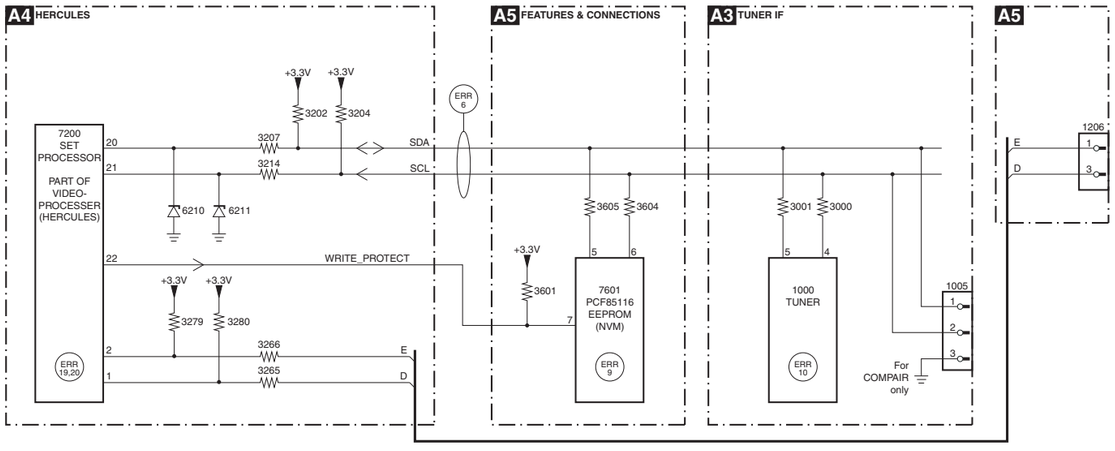
I2C and Supply Voltage Overview

SUPPLY LINES DIAGRAM



I2C BUS INTERCONNECTION DIAGRAM



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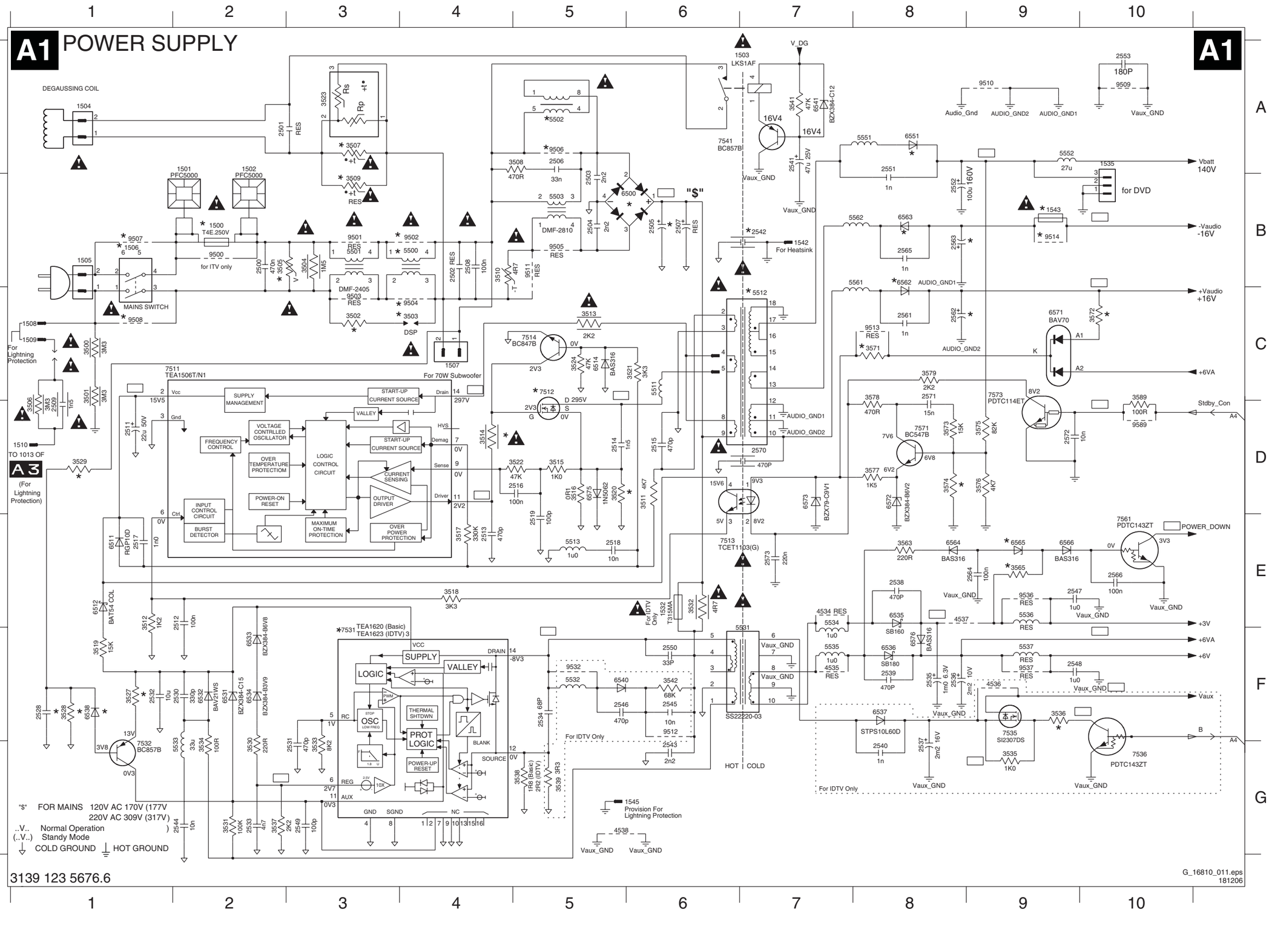
7. Circuit Diagrams and PWB Layouts

Mono Carrier: Power Supply



Mono Carrier: Diversity Table for A1

DIVERSITY TABLE FOR A 1 POWER SUPPLY

REGION	NAFTA			LATAM / AP						CHINA			INDIA		EUROPE					
MAIN RANGE	LR			FR						HR			HR		HR					
SET	27RF 27FSQ	32RF	26WSRF 30WSRF 32FSQ	21RF	25RF 29FSQ	29RF	29RF	28WSSF	28WSRF 32WSRF	21/25RF	29RF	34RF	21/29RF	21/29RF 29FSQ	21RF	29RF 28WSSF	29RF	24WR 25/28BLD	28WSRF	32WSRF
VBATT	130V	130V	143V	130V	130V	130V	130V	143V	143V	130V	130V	130V	130V	130V	130V	130V	130V	143V	143V	143V
AUDIO OUTPUT	2X5W 2X10W	2X5W 2X10W	2X5W 2X10W	2X10W	2X5W 2X10W	2X5W	2X10W	2X5W	2X10W	2X10W	2X5W 2X10W	2X10W	2X5W 2X10+20W	2X15W	2X5W 2X10W	2X5W	2X10W	2X5W 2X10W	2X5W 2X10W	2X5W 2X10W
1508	---	---	---	WIRE SIN 180 SIN 18ST BK	WIRE SIN 180 SIN 18ST BK	WIRE SIN 180 SIN 18ST BK	WIRE SIN 180 SIN 18ST BK	WIRE SIN 180 SIN 18ST BK	WIRE SIN 180 SIN 18ST BK	WIRE SIN 180 SIN 18ST BK	WIRE SIN 180 SIN 18ST BK	WIRE SIN 180 SIN 18ST BK	WIRE SIN 180 SIN 18ST BK	WIRE SIN 180 SIN 18ST BK	WIRE SIN 180 SIN 18ST BK	WIRE SIN 180 SIN 18ST BK	WIRE SIN 180 SIN 18ST BK	WIRE SIN 180 SIN 18ST BK	WIRE SIN 180 SIN 18ST BK	WIRE SIN 180 SIN 18ST BK
1510	---	---	---	WIRE SIN 400 SIN 18ST BK	WIRE SIN 400 SIN 18ST BK	WIRE SIN 400 SIN 18ST BK	WIRE SIN 400 SIN 18ST BK	WIRE SIN 400 SIN 18ST BK	WIRE SIN 400 SIN 18ST BK	WIRE SIN 400 SIN 18ST BK	WIRE SIN 400 SIN 18ST BK	WIRE SIN 400 SIN 18ST BK	WIRE SIN 400 SIN 18ST BK	WIRE SIN 400 SIN 18ST BK	WIRE SIN 400 SIN 18ST BK	WIRE SIN 400 SIN 18ST BK	WIRE SIN 400 SIN 18ST BK	WIRE SIN 400 SIN 18ST BK	WIRE SIN 400 SIN 18ST BK	WIRE SIN 400 SIN 18ST BK
2505	200V 470U	200V 470U	200V 470U	400V 330U	400V 330U	400V 330U	400V 330U	400V 330U	400V 330U	450V 220U	450V 220U	450V 220U	450V 220U	450V 220U	400V 220U	400V 220U	400V 220U	400V 220U	400V 220U	400V 220U
2506	---	---	---	---	---	---	---	---	---	---	400V 33N	400V 33N	---	---	---	---	400V 33N	---	400V 33N	400V 33N
2508	---	---	---	275V 100N	275V 100N	275V 100N	275V 100N	275V 100N	275V 100N	275V 100N	275V 100N	275V 100N	---	---	275V 100N	275V 100N	275V 100N	275V 100N	275V 100N	275V 100N
2509	---	---	---	250V 1N5	250V 1N5	250V 1N5	250V 1N5	250V 1N5	250V 1N5	250V 1N5	250V 1N5	250V 1N5	250V 1N5	250V 1N5	250V 1N5	250V 1N5	250V 1N5	250V 1N5	250V 1N5	250V 1N5
2528	---	---	---	470N	470N	470N	470N	470N	470N	470N	470N	470N	470N	470N	470N	470N	470N	470N	470N	470N
2542	250V 1N5	250V 1N5	250V 1N5	250V 1N	250V 1N	250V 1N	250V 1N	250V 1N	250V 1N	250V 1N	250V 1N	250V 1N	250V 1N	250V 1N	250V 1N	250V 1N	250V 1N	250V 1N	250V 1N	250V 1N
2570	---	---	---	250V 470P	250V 470P	250V 470P	250V 470P	250V 470P	250V 470P	250V 470P	250V 470P	250V 470P	250V 470P	250V 470P	250V 470P	250V 470P	250V 470P	250V 470P	250V 470P	250V 470P
3505	1MA/423V	1MA/423V	1MA/423V	1MA/612V	1MA/612V	1MA/612V	1MA/612V	1MA/612V	1MA/612V	1MA/612V	1MA/612V	1MA/612V	1MA/612V	1MA/612V	1MA/612V	1MA/612V	1MA/612V	1MA/612V	1MA/612V	1MA/612V
3506	---	---	---	3M3	3M3	3M3	3M3	3M3	3M3	3M3	3M3	3M3	3M3	3M3	3M3	3M3	3M3	3M3	3M3	3M3
3507	---	144V 3R	144V 3R	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
3508	---	---	---	---	---	---	---	---	---	---	470R	470R	---	---	---	---	470R	---	470R	470R
3514	100R	100R	100R	47R	47R	47R	47R	47R	47R	47R	47R	47R	47R	47R	47R	47R	47R	47R	47R	47R
3520	0R18	0R18	0R18	0R33	0R33	0R33	0R22	0R33	0R22	0R33	0R33	0R33	0R33	0R33	0R33	0R33	0R33	0R33	0R33	0R33
3527	---	---	---	47K	47K	47K	47K	47K	47K	47K	47K	47K	47K	47K	47K	47K	47K	47K	47K	47K
3528	---	---	---	1M	1M	1M	1M	1M	1M	1M	1M	1M	1M	1M	1M	1M	1M	1M	1M	1M
3529	---	---	---	2M2	2M2	2M2	2M2	2M2	2M2	2M2	2M2	2M2	2M2	2M2	2M2	2M2	2M2	2M2	2M2	2M2
3523	145V 1R5	---	---	276V 4R5	276V 4R5	276V4R5	276V 4R5	276V 4R5	276V 4R5	276V 4R5	276V 4R5	276V 4R5	276V 4R5	276V 4R5	276V 4R5	276V 4R5	276V 4R5	276V 4R5	276V 4R5	276V 4R5
3565	15K	15K	15K	18K	18K	18K	18K	18K	18K	15K	15K	15K	15K	15K	15K	15K	15K	15K	15K	15K
3574	150K	150K	33K	150K	150K	150K	150K	33K	33K	150K	150K	150K	150K	150K	150K	150K	150K	33K	33K	33K
5500	---	---	---	10MH 2A	10MH 2A	10MH 2A	10MH 2A	10MH 2A	10MH 2A	20MH 1A5	20MH 1A5	20MH 1A5	---	---	20MH 1A5	20MH 1A5	20MH 1A5	20MH 1A5	20MH 1A5	20MH 1A5
5502	---	---	---	---	---	---	---	---	---	---	65MH	65MH	---	---	---	---	65MH	---	65MH	38MH
5512	SS40310-01	SS40310-01	SS40312-01	SS42315-01	SS42315-01	SS42315-01	SS49309-01	SS42316-01	SS49308-01	SS42315-01	SS42315-01	SS42315-01	SS42315-01	SS42317-01	SS42315-01	SS42315-01	SS42315-01	SS42316-01	SS42316-01	SS42316-01
6500	GBU4JL	GBU6JL	GBU6JL	GBU4JL	GBU4JL	GBU6JL	GBU6JL	GBU6JL	GBU6JL	GBU4JL	GBU4JL	BYV29X-500	GBU4JL	GBU4JL	GBU4JL	GBU4JL	GBU4JL	GBU4JL	GBU4JL	GBU4JL
6538	---	---	---	BAS316	BAS316	BAS316	BAS316	BAS316	BAS316	BAS316	BAS316	BAS316	BAS316	BAS316	BAS316	BAS316	BAS316	BAS316	BAS316	BAS316
6551	STTH8L06D	BYV29X-500	BYV29X-500	STTH8L06D	STTH8L06D	STTH8L06D	STTH8L06D	STTH8L06D	BYV29X-500	STTH8L06D	STTH8L06D	GBU4JL	STTH8L06D	STTH8L06D	STTH8L06D	STTH8L06D	STTH8L06D	STTH8L06D	STTH8L06D	BYV29X-500
6565	UDZS9.1B	UDZS9.1B	UDZS9.1B	UDZS7.5B	UDZS7.5B	UDZS7.5B	UDZS7.5B	UDZS7.5B	UDZS7.5B	UDZS10B	UDZS10B	UDZS10B	UDZS10B	UDZS10B	UDZS10B	UDZS10B	UDZS10B	UDZS10B	UDZS10B	UDZS10B
7512	FQPF9N50	FQPF9N50	FQPF9N50	FQPF7N80	STP10NK8OZFP	STP10NK8OZFP	STP10NK8OZFP	STP10NK8OZFP	STP10NK8OZFP	FQPF7N80	FQPF7N80	FQPF7N80	FQPF7N80	FQPF7N80	FQPF7N80	FQPF7N80	FQPF7N80	FQPF7N80	FQPF7N80	FQPF7N80
7532	---	---	---	BC857B	BC857B	BC857B	BC857B	BC857B	BC857B	BC857B	BC857B	BC857B	BC857B	BC857B	BC857B	BC857B	BC857B	BC857B	BC857B	BC857B
9502	JMP	JMP	JMP	---	---	---	---	---	---	---	---	---	JMP	JMP	---	---	---	---	---	---
9504	JMP	JMP	JMP	---	---	---	---	---	---	---	---	---	JMP	JMP	---	---	---	---	---	---
9506	JMP	JMP	JMP	JMP	JMP	JMP	JMP	JMP	JMP	JMP	---	---	JMP	JMP	JMP	JMP	---	JMP	---	---

AUDIO OUTPUT	2X5W	2X10W	2X10+20W	2X15W
		---	---	
1543	---	---	2A 250V	2A250V
2562	25V 1000uF	25V 2200uF	25V 2200uF	25V 2200uF
2563	25V 1000uF	25V 2200uF	25V 2200uF	25V 2200uF
3571	220R	220R	220R	680R
3572	220R	220R	220R	470R
6562	SB360	SB360	SB360	SB380
6563	SB360	SB360	SB360	SB380
9514	JMP	JMP	---	---

REGION	NAFTA	ROW
1506	---	Main Switch
9507	JMP	---
9508	JMP	---

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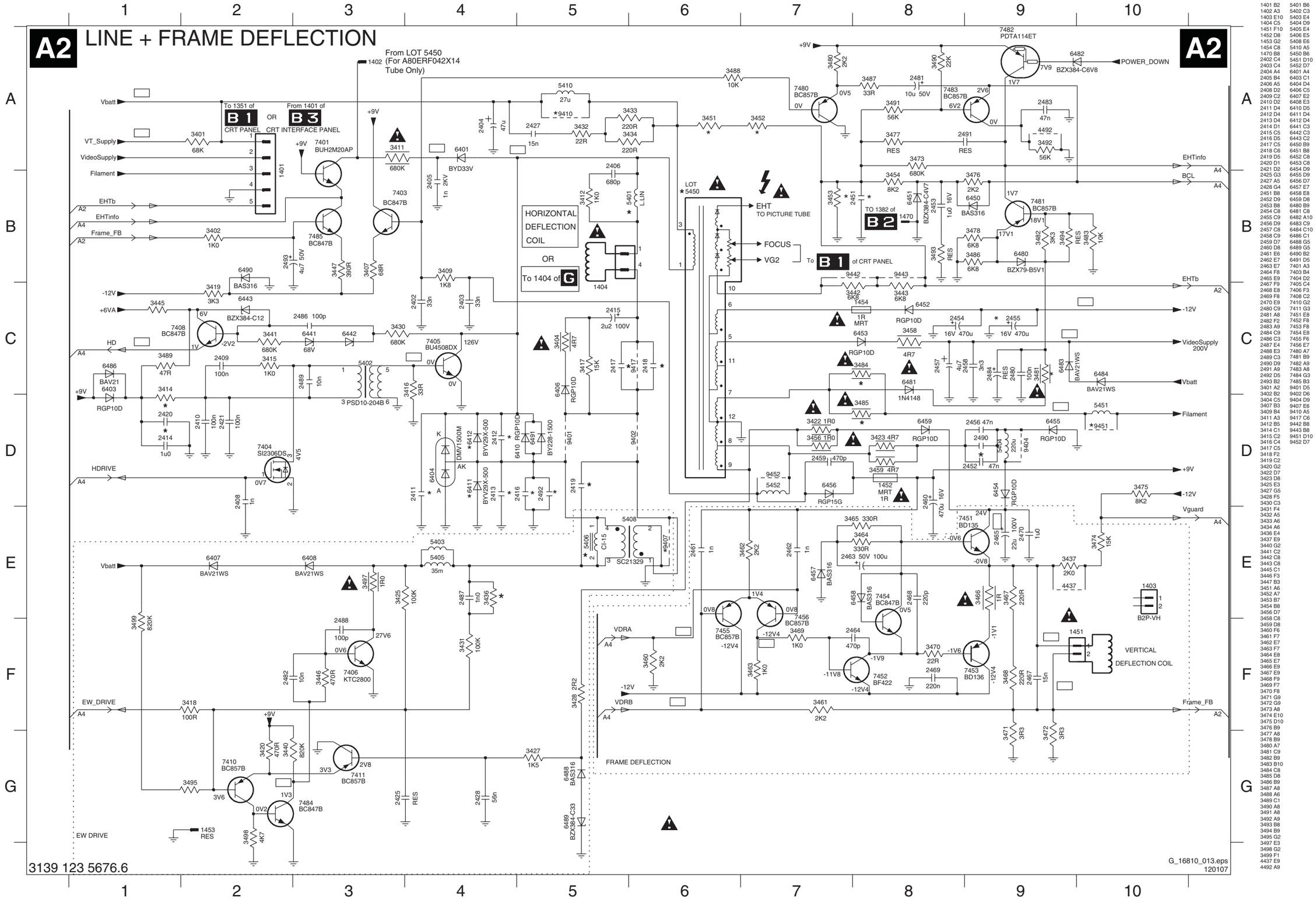
Mono Carrier: Deflection



Mono Carrier: Diversity Table for A2

A2 DEFLECTION

Region	NAFTA							LATAM						AP					CHINA				INDIA		
Tube	LPD	LPD	LPD	LPD	LPD	LPD	SMGK	LPD	LPD	LPD	LPD	LPD	SMGK	CPT	LPD	LPD	LPD	LPD	LPD	LPD	LPD	LPD	CPD	LPD	SMGK
Size	27 V	28 WR	29 RF	32 V	32 V RF	32 WR	25 RF	25 RF	27V	28WS	28WR	32WR	29RF	21RF	25RF	29RF	32WR	34RF	25RF	21RF	29RF	34RF	21RF	29RF	29FSQ
2411	470pF	1.2nF	1.5nF	2.2nF	680pF	330pF	1.2nF	680nF	470pF	1.2nF	1.2nF	330pF	1.5nF	220pF	680nF	1.2nF	330pF	1nF	680nF	220pF	1.2nF	1nF	220pF	1.2nF	680pF
2412	12nF	13nF	15nF	15nF	12nF	13nF	15nF	15nF	12nF	15nF	13nF	13nF	15nF	8n2	15nF	15nF	13nF	12nF	15nF	8n2	15nF	12nF	8n2	15nF	13nF
2413	120nF	15nF	39nF	33nF	33nF	18nF	33nF	33nF	120nF	18nF	15nF	18nF	39nF	68nF	33nF	33nF	18nF	33nF	33nF	68nF	33nF	33nF	68nF	33nF	39nF
2416	-	3n3	-	-	4n7	-	-	-	-	2n2	3n3	-	-	-	-	3n3	-	-	-	-	3n3	-	-	3n3	-
2418	390nF	-	330nF	470nF	270nF	-	390nF	360nF	390nF	-	-	-	330nF	220nF	360nF	330nF	-	300nF	360nF	270nF	330nF	300nF	220nF	330nF	390nF
2419	-	390nF	2u2	2u2	2u2	430nF	2u2	2u2	-	470nF	390nF	430nF	2u2	-	2u2	2u2	430nF	2u2	2u2	-	2u2	2u2	-	2u2	2u2
2425	-	33nF	33nF	33nF	10nF	33nF	33nF	33nF	-	33nF	33nF	33nF	33nF	-	33nF	33nF	33nF	10nF	33nF	-	33nF	10nF	-	33nF	33nF
2451	150nF	150nF	180nF	180nF	150nF	180nF	100nF	100nF	150nF	120nF	150nF	180nF	100nF	120nF	120nF	220nF	180nF	270nF	120nF	220nF	220nF	270nF	120nF	220nF	220nF
2457	4u7	4u7	4u7	4u7	4u7	4u7	4u7	4u7	4u7	4u7	4u7	4u7	4u7	4u7	4u7	4u7	4u7	4u7	4u7	4u7	4u7	4u7	4u7	4u7	4u7
2487	-	1n5	1n5	1n5	2n2	1n5	1n5	1n5	-	1n5	1n5	1n5	3n3	1nF	1n5	1nF	1n5	3n3	1n5	1nF	1nF	3n3	1nF	1nF	1nF
2490	47n	-	-	-	-	-	47n	-	47n	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3224	680K 5%	680K 5%	680K 5%	680K 5%	560K 5%	680K 5%	680K 5%	680K 5%	680K 5%	680K 5%	560K 5%	680K 5%	680K 5%	1M 5%	680K 5%	680K 5%	680K 5%	1M 5%	680K 5%	1M 5%	680K 5%	1M 5%	1M 5%	680K 5%	1M 5%
3295	8K2 5%	10K 5%	8K2 5%	8K2 5%	8K2 5%	8K2 5%	8K2 5%	8K2 5%	8K2 5%	8K2 5%	10K 5%	8K2 5%	8K2 5%	2K7 5%	8K2 5%	10K 5%	8K2 5%	7K5 1%	8K2 5%	8K2 5%	10K 5%	7K5 1%	2K7 5%	10K 5%	8K2 5%
3414	1R 1W 5%	2R2 1W 5%	1R 1W 5%	0R33 1W 5%	1R 1W 5%	6R8 1W 5%	3R3 1W 5%	1R 1W 5%	1R 1W 5%	4R7 1W 5%	2R2 1W 5%	6R8 1W 5%	0R33 1W 5%	10R 1W 5%	1R 1W 5%	1R 1W 5%	6R8 1W 5%	6R8 1W 5%	1R 1W 5%	4R7 1W 5%	1R 1W 5%	6R8 1W 5%	10R 1W 5%	1R 1W 5%	4R7 1W 5%
3431	82K 1%	82K 1%	82K 1%	82K 1%	10K 1%	82K 1%	82K 1%	82K 1%	82K 1%	82K 1%	82K 1%	82K 1%	82K 1%	82K 1%	82K 1%	82K 1%	82K 1%	10K 1%	82K 1%	82K 1%	82K 1%	10K 1%	82K 1%	82K 1%	82K 1%
3451	68K 1%	82K 1%	68K 1%	75K 1%	68K 1%	82K 1%	68K 1%	68K 1%	68K 1%	120K 1%	82K 1%	82K 1%	68K 1%	82K 1%	68K 1%	68K 1%	82K 1%	68K 1%	68K 1%	68K 1%	68K 1%	68K 1%	82K 1%	68K 1%	56K 1%
3452	18K 5%	15K 5%	15K 5%	15K 5%	6K8 5%	6K8 5%	18K 5%	18K 5%	18K 5%	27K 5%	15K 5%	6K8 5%	15K 5%	18K 5%	18K 5%	15K 5%	6K8 5%	18K 5%	18K 5%	18K 5%	15K 5%	18K 5%	18K 5%	15K 5%	18K 5%
3453	33K 5%	22K 5%	33K 5%	22K 5%	33K 5%	22K 5%	33K 5%	33K 5%	33K 5%	33K 5%	22K 5%	22K 5%	33K 5%	33K 5%	33K 5%	33K 5%	22K 5%	33K 5%	33K 5%	33K 5%	33K 5%	33K 5%	33K 5%	33K 5%	33K 5%
3467	120R 5%	120R 5%	120R 5%	220R 5%	150R 5%	220R 5%	120R 5%	120R 5%	120R 5%	220R 5%	120R 5%	220R 5%	120R 5%	220R 5%	120R 5%	120R 5%	220R 5%	150R 5%	120R 5%	220R 5%	120R 5%	150R 5%	220R 5%	120R 5%	220R 5%
3468	220R 5%	150R 5%	150R 5%	150R 5%	150R 5%	220R 5%	150R 5%	150R 5%	220R 5%	220R 5%	150R 5%	220R 5%	150R 5%	220R 5%	150R 5%	150R 5%	220R 5%	150R 5%	150R 5%	220R 5%	150R 5%	150R 5%	220R 5%	150R 5%	220R 5%
3471	-	2R7 1%	2R4 1%	2R4 1%	2R2 1%	1R8 1%	2R2 1%	2R4 1%	-	2R2 1%	2R7 1%	1R8 1%	1R8 1%	2R2 1%	2R4 1%	2R4 1%	1R8 1%	2R2 1%	2R4 1%	3R9 1%	2R4 1%	2R2 1%	2R2 1%	2R4 1%	2R2 1%
3472	3R3 1%	2R4 1%	2R4 1%	2R7 1%	2R2 1%	3R3 1%	2R 1%	2R4 1%	3R3 1%	3R3 1%	2R4 1%	3R3 1%	2R2 1%	3R9 1%	2R4 1%	2R4 1%	3R3 1%	2R2 1%	2R4 1%	4R7 1%	2R4 1%	2R2 1%	3R9 1%	2R4 1%	2R2 1%
3473	390K 5%	680K 5%	820K 5%	820K 5%	820K 5%	820K 5%	680K 5%	820K 5%	390K 5%	1M 5%	680K 5%	820K 5%	1M 5%	390K 5%	820K 5%	680K 5%	820K 5%	430K 5%	820K 5%	680K 5%	680K 5%	430K 5%	390K 5%	680K 5%	680K 5%
3474	15K 5%	12K 5%	15K 5%	15K 5%	15K 5%	15K 5%	15K 5%	15K 5%	15K 5%	12K 5%	15K 5%	15K 5%	15K 5%	15K 5%	15K 5%	15K 5%	15K 5%	15K 5%	15K 5%	15K 5%	15K 5%	15K 5%	15K 5%	15K 5%	15K 5%
3481	5R6 5%	5R6 5%	10R 5%	2R7 5%	5R6 5%	4R7 5%	-	-	5R6 5%	-	5R6 5%	4R7 5%	-	-	-	-	4R7 5%	-	-	-	-	-	-	-	-
3482	22K 1%	22K 1%	2K4 1%	22K 1%	22K 1%	22K 1%	-	-	22K 1%	-	22K 1%	22K 1%	-	-	-	-	22K 1%	-	-	-	-	-	-	-	-
3483	56K 1%	56K 1%	5K6 1%	56K 1%	56K 1%	56K 1%	-	-	56K 1%	-	56K 1%	56K 1%	-	-	-	-	56K 1%	-	-	-	-	-	-	-	-
3491	100K 5%	100K 5%	100K 5%	82K 5%	68K 5%	82K 5%	100K 5%	100K 5%	100K 5%	82K 5%	100K 5%	82K 5%	82K 5%	82K 5%	100K 5%	82K 5%	82K 5%	82K 5%	100K 5%	56K 5%	82K 5%	82K 5%	82K 5%	82K 5%	56K 5%
3494	180K 5%	-	100K 5%	150K 5%	680K 5%	680K 5%	-	-	180K 5%	-	-	680K 5%	-	-	-	-	680K 1%	-	-	-	-	-	-	-	-
3499	680K 5%	680K 5%	680K 5%	330K 5%	680K 5%	680K 5%	680K 5%	680K 5%	680K 5%	680K 5%	680K 5%	680K 5%	680K 5%	680K 5%	680K 5%	680K 5%	680K 5%	680K 5%	680K 5%	680K 5%	56K 5%	56K 5%	56K 5%	56K 5%	56K 5%
5401	50uH	42uH	33uH	33uH	25uH	42uH	33uH	37uH	50uH	16uH	42uH	42uH	25uH	82uH	37uH	33uH	42uH	42uH	-	82uH	33uH	42uH	82uH	33uH	33uH
5408	-	SC2132 9-00B	CU15	CU15	CU15	SC2132 9-00B	CU15	CU15	-	SC2132 9-00B	SC2132 9-00B	SC2132 9-00B	SC2132 9-00B	-	CU15	CU15	SC2132 9-00B	CU15	CU15	-	CU15	CU15	-	CU15	CU15
5450	JF0501-21835B	JF0501-85021B	JF0501-21836B	JF0501-21140B	JF0101-85020B	JF0101-85021B	JF0501-21835B	JF0501-2153B	JF0501-21835B	JF0501-21133B	JF0501-85021B	JF0101-85021B	JF0501-2136B	JF0501-2135B	JF0501-2135B	JF0501-2136B	JF0101-85021B	JF0501-2601B	JF0501-2135B	JF0501-2135B	JF0501-2136B	JF0501-2601B	JF0501-2135B	JF0501-2136B	JF0501-2133B
5451	27uH 10%	JMP	33uH 10%	27uH 10%	JMP	JMP	33uH 10%	27uH 10%	27uH 10%	39uH 10%	JMP	JMP	27uH 10%	68uH 5%	27uH 10%	27uH 10%	0.58mm COL	22uH	27uH 10%	68uH 5%	27uH 10%	22uH	68uH 5%	27uH 10%	22uH 10%
6404	DVM1500M	-	DVM1500M	DVM1500M	DVM1500M	-	DVM1500M	DVM1500M	DVM1500M	-	-	-	DMV1500M	DVM1500M	DVM1500M	DVM1500M	-	DVM1500M	DVM1500M	DVM1500M	DVM1500M	DVM1500M	DVM1500M	DVM1500M	DVM1500M
6411	-	BY229X-800	-	-	-	BY229X-800	-	-	-	BY229X-80	BY229X-80	BY229X-800	-	-	-	-	BY229X-800	-	-	-	-	-	-	-	-
6412	-	BY359X-1500	-	-	-	BY359X-1500	-	-	-	BY359X-1500	BY359X-1500	BY359X-1500	-	-	-	-	BY359X-1500	-	-	-	-	-	-	-	-
7405	BU4508DX	BU2725DX	BU4508DX	BU2725DX	BU4508DX	BU2725DX	BU4508DX	BU4508DX	BU4508DX	BU4508DX	BU2725DX	BU2725DX	BU4508DX	BU4508DX	BU4508DX	BU4508DX	BU2725DX	BU4508DX	BU4508DX	BU4508DX	BU4508DX	BU4508DX	BU4508DX	BU4508DX	BU4508DX
9407	-	-	JMP	JMP	JMP	-	JMP	JMP	-	-	JMP	-	JMP	-	JMP	JMP	-	JMP	JMP	-	JMP	JMP	-	JMP	JMP
9417	-	JMP	-	-	-	JMP	-	-	-	JMP	JMP	JMP	-	-	-	-	JMP	-	-	-	-	-	-	-	-

Region	EUROPE							
Tube	LPD	LPD	LPD	LPD	LPD	LPD	LPD	LPD
Size	21RF	24 WR	25 I	28 I	29 RF	28 WR	28 WS	32 WR
2411	470pF	1n2	470pF	470pF	1nF	680pF	680pF	680pF
2412	8n2	13nF	9n1	9n1	13nF	11nF	11nF	11nF
2413	33nF	15nF	18nF	18nF	33nF	15nF	15nF	15nF
2416	-	2n2	-	-	-	4n7	2n2	4n7
2418	470nF	-	390nF	390nF	360nF	-	-	-
2419	2u2	470nF	470nF	470nF	2u2	430nF	470nF	430nF
2425	33nF	33nF	33nF	33nF	33nF	33nF	33nF	33nF
2451	220nF	220nF	220nF	220nF	220nF	220nF	220nF	220nF
2457	4u7	4u7	4u7	4u7	4u7	4u7	4u7	4u7
2487	1nF	1nF	1nF	1nF	1nF	1nF	1nF	1nF
2490	47n	-	-	-	-	-	-	-
3224	1M 5%	1M 5%	1M 5%	1M 5%	1M 5%	1M 5%	1M 5%	1M 5%
3295	8K2 5%	8K2 5%	8K2 5%	8K2 5%	8K2 5%	8K2 5%	8K2 5%	8K2 5%
3414	4R7 1W	4R7 1W	10R 1W 5%	10R 1W 5%	2R2 1W	3R3 1W	4R7 1W	3R3 1W
3431	82K 1%	82K 1%	82K 1%	82K 1%	82K 1%	82K 1%	82K 1%	68K 1%
3451	68K 1%	56K 1%	120K 5%	120K 5%	68K 1%	68K 1%	68K 1%	18K 5%
3452	18K 5%	18K 5%	18K 5%	18K 5%	18K 5%	18K 5%	18K 5%	220R 5%
3453	22K 5%	22K 5%	33K 5%	33K 5%	33K 5%	22K 5%	22K 5%	220R 5%
3467	220R 5%	220R 5%	220R 5%	220R 5%	220R 5%	220R 5%	220R 5%	1R5 1%
3468	220R 5%	220R 5%	220R 5%	220R 5%	220R 5%	220R 5%	220R 5%	6R8 1%
3471	3R3 1%	3R3 5%	1R5 1%	1R5 1%	2R2 1%	1R5 1%	3R3 1%	470K 5%
3472	3R3 1%	3R3 1%	2R2 1%	2R2 1%	2R2 1%	6R8 1%	3R3 1%	15K 5%
3473	470K 5%	470K 5%	680K 5%	680K 5%	680K 5%	470K 5%	470K 5%	-
3474	15K 5%	15K 5%	15K 5%	15K 5%	15K 5%	15K 5%	15K 5%	-
3481	-	-	-	-	-	-	-	-
3482	-	-	-	-	-	-	-	56K 5%
3483	-	-	-	-	-	-	-	56K 5%
3491	56K 5%	56K 5%	56K 5%	56K 5%	56K 5%	56K 5%	56K 5%	-
3494	56K 5%	56K 5%	56K 5%	56K 5%	56K 5%	56K 5%	56K 5%	680K 5%
3499	680K 5%	680K 5%	680K 5%	680K 5%	680K 5%	680K 5%	680K 5%	680K 5%
5401	82uH	37uH	50uH	50uH	25uH	50uH	25uH	25uH
5408	CU15	SC21329-00B	SC21329-00B	SC21329-00B	CU15	SC21329-00B	SC21329-00B	SC21329-00B
5450	1342.0033CY	1342.0048B	1342.0048B	1342.0048B	1362.0016AB	1362-0015AB	1342.0042CY	1362-0015AB
5451	22uH 10%	22uH 10%	27uH 10%	27uH 10%	39uH 10%	0.588 COL	22uH 10%	33uH 10%
6404	DVM1500M	-	-	-	DVM1500M	-	-	-
6411	-	BY229X-800	BY229X-800	BY229X-800	-	BY229X-800	BY229X-800	BY229X-800
6412	-	BY359X-1500	BY359X-1500	BY359X-1500	-	BY359X-1500	BY359X-1500	BY359X-1500
7405	BU4508DX	BU2725DX	BU2725DX	BU2725DX	BU4508DX	BU2725DX	BU4508DX	BU2725DX
9407	JMP	-	-	-	JMP	-	-	-
9417	-	JMP	-	-	-	JMP	JMP	JMP

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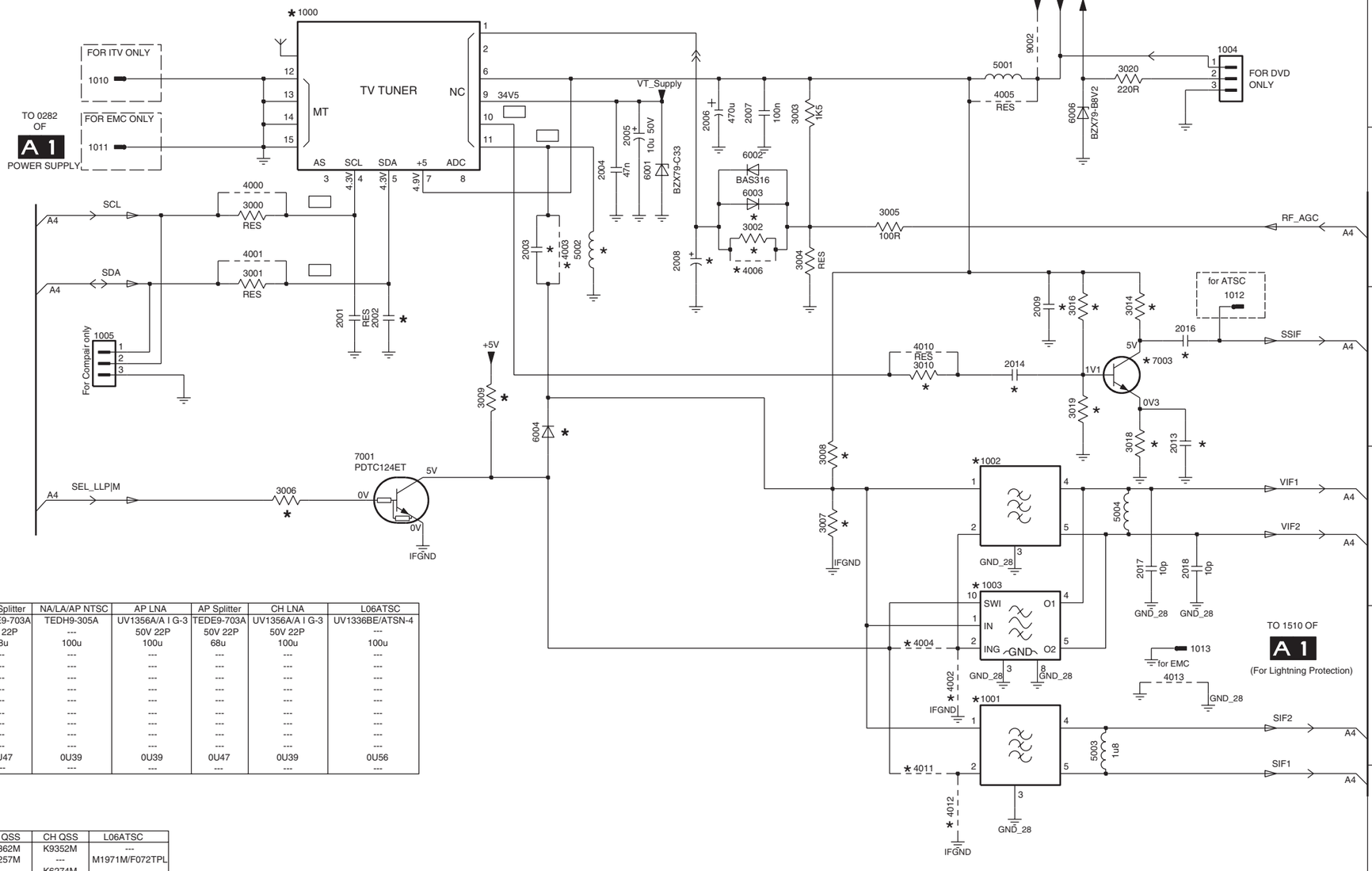
Mono Carrier: Tuner IF

A3 TUNER IF

A3



ITEM	EU Normal	EU FM Radio	EU Splitter	NA/LA/AP NTSC	AP LNA	AP Splitter	CH LNA	L06ATSC
1000	UV1316E/A I-4	UR1316/A I-3	TEDE9-703A	TEDH9-305A	UV1356A/A I G-3	TEDE9-703A	UV1356A/A I G-3	UV1336BE/ATSN-4
2002	50V 22P	50V 22P	50V 22P	---	50V 22P	50V 22P	50V 22P	---
2008	68u	68u	68u	100u	100u	68u	100u	100u
2009	---	16V 100N	---	---	---	---	---	---
2013	---	25V 1N	---	---	---	---	---	---
2014	---	25V 1N	---	---	---	---	---	---
2016	---	25V 1N	---	---	---	---	---	---
3010	---	330R	---	---	---	---	---	---
3014	---	820R	---	---	---	---	---	---
3016	---	100K	---	---	---	---	---	---
3018	---	560R	---	---	---	---	---	---
3019	---	150K	---	---	---	---	---	---
5002	0U47	0U47	0U47	0U39	0U39	0U47	0U39	0U56
7003	---	BFS20	---	---	---	---	---	---

ITEM	EU-QSS	NA/LA/AP INT	AP QSS	CH QSS	L06ATSC
1001	K9656M	---	K9362M	K9352M	---
1002	K3953M	M1971M	K7257M	---	M1971M/F072TPL
1003	---	---	---	K6274M	---
2003	50V 10N	---	50V 10N	50V 10N	---
3002	10K	---	---	---	---
3006	10K	---	10K	10K	---
3007	2K2	---	2K2	2K2	---
3008	6K8	---	6K8	6K8	---
3009	2K2	---	2K2	2K2	---
4002	JMP	JMP	---	JMP	JMP
4003	---	JMP	---	---	JMP
4004	---	---	JMP	---	---
4006	---	JMP	JMP	JMP	JMP
4011	JMP	---	---	---	---
4012	---	---	JMP	JMP	---
6002	BAS316	---	---	---	---
6004	1SS356	---	1SS356	1SS356	---
7001	PDTC124ET	---	PDTC124ET	PDTC124ET	---

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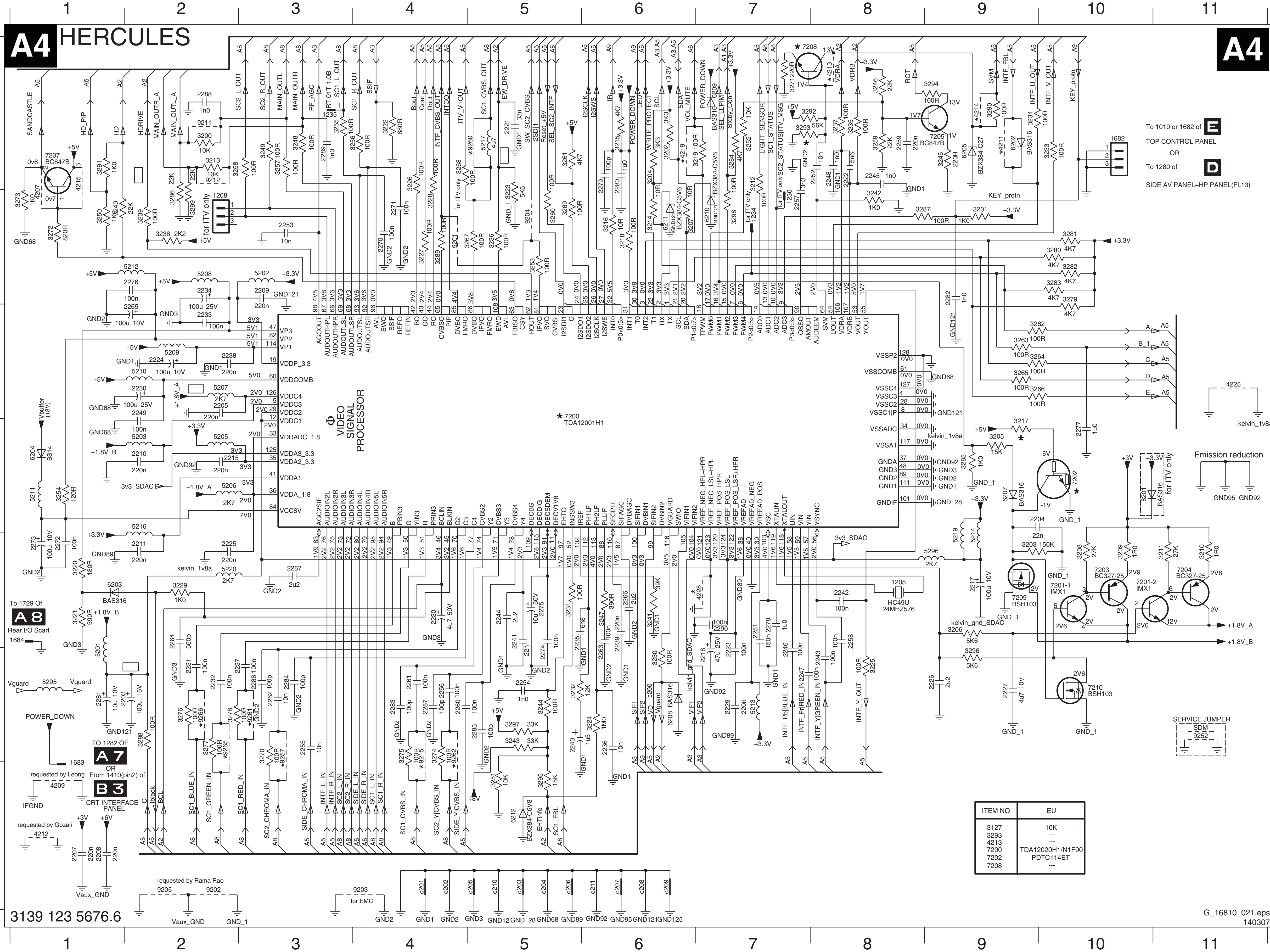
Mono Carrier: Hercules

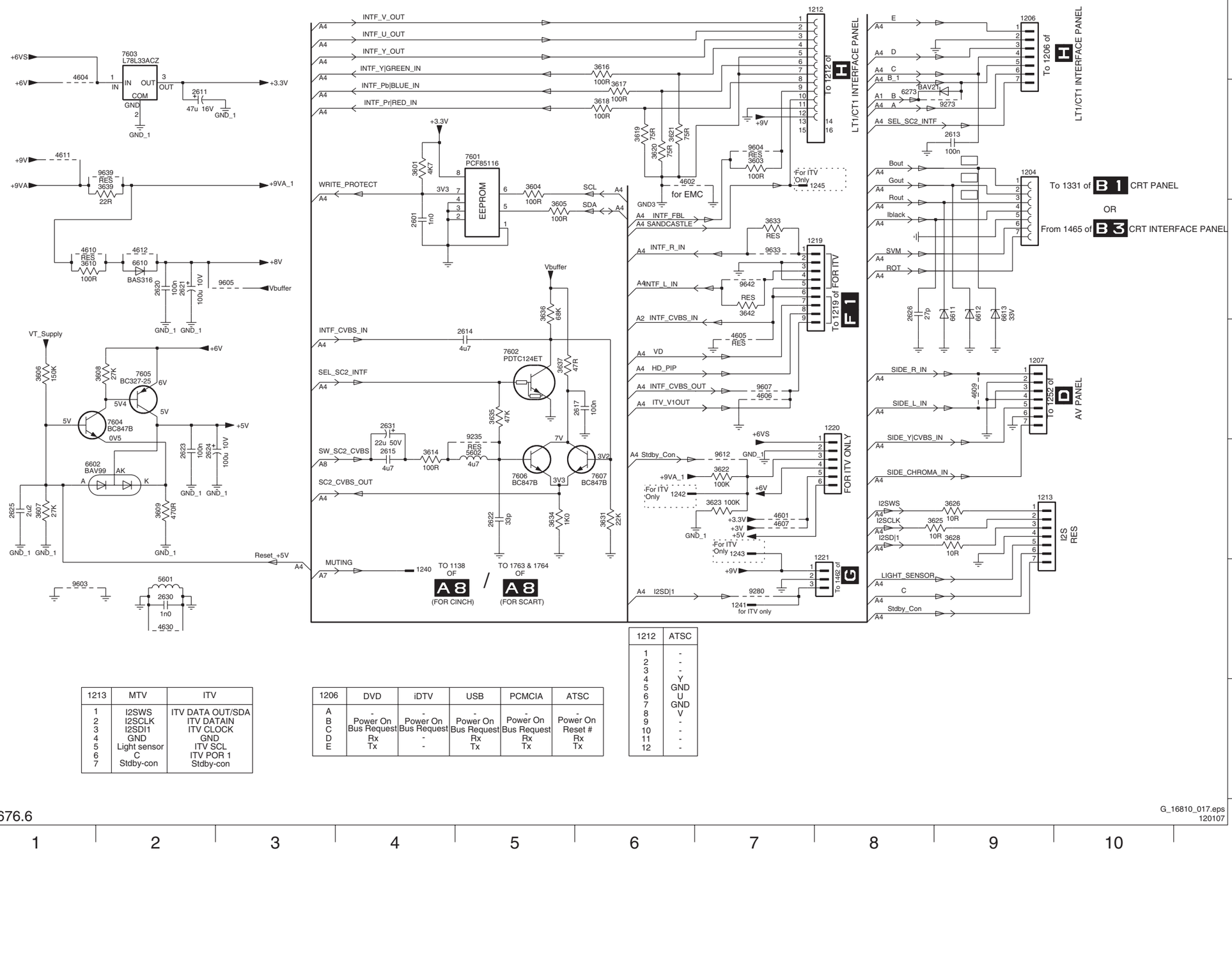


ITEM NO	EU
3127	10K
3293	---
4213	---
7200	TDA12020H1/N1F90
7202	PDTC114ET
7208	---

1205 E8	3208 E10	4211 A9
1208 B2	3209 E10	4212 G1
1230 B7	3210 E11	4213 A8
1234 B7	3211 E11	4214 A9
1235 A3	3212 A7	4215 A1
1682 A10	3213 A2	4219 A6
1683 F1	3214 B6	4225 C11
1684 E1	3215 A6	4228 E7
2203 F2	3216 B6	5201 F1
2204 D9	3217 D9	5202 B3
2205 C2	3218 B6	5203 D2
2207 G1	3219 A7	5205 D2
2208 G1	3220 E1	5206 D2
2209 B3	3221 E1	5207 C2
2210 D2	3222 A4	5208 B2
2211 E2	3223 B5	5209 C2
2215 D2	3224 F6	5210 C2
2217 E9	3225 F8	5211 D1
2218 F7	3226 A4	5212 B2
2221 A5	3227 B4	5213 F7
2222 A8	3228 B4	5214 E9
2223 F7	3229 E2	5216 D2
2224 C2	3230 F6	5217 A5
2225 E2	3231 E5	5219 E9
2226 F9	3232 F5	5220 E2
2227 F9	3233 A10	5295 F1
2229 F7	3234 A9	5296 E9
2230 E4	3235 A8	6201 D10
2231 F2	3236 B5	6202 A9
2232 F2	3237 A8	6203 E1
2233 C2	3238 B2	6204 D1
2234 B2	3239 B2	6205 A9
2235 E5	3240 B1	6207 D9
2236 F6	3241 E6	6208 F6
2237 F3	3242 B8	6209 A7
2238 C2	3243 F5	6210 B7
2239 E6	3244 F5	6211 B6
2240 F5	3245 A9	6212 G5
2241 E5	3246 A8	7200 C5
2242 E8	3247 E6	7201-1 E10
2243 F8	3248 A3	7201-2 E10
2244 E5	3249 A3	7202 D10
2245 A8	3250 B1	7203 E10
2246 F7	3251 G5	7204 E11
2247 F7	3252 A7	7205 A9
2248 A8	3253 B5	7207 A1
2249 C2	3254 D1	7208 A8
2250 C2	3255 A3	7209 E9
2251 E7	3256 A4	7210 F10
2252 A8	3257 A3	9201 B4
2253 B3	3258 A2	9202 G2
2254 F5	3259 A8	9203 G4
2255 F3	3260 B5	9204 B5
2256 F4	3261 A5	9205 G2
2257 B7	3262 C9	9211 A2
2258 E8	3263 C9	9212 A2
2259 A8	3264 C9	9215 F4
2260 F4	3265 C9	9257 F3
2261 F4	3266 C9	9260 A5
2262 F3	3267 B5	9261 F3
2263 F6	3268 A4	9262 F4
2264 E2	3269 B5	9265 F2
2265 C2	3270 F3	9266 F2
2266 E6	3271 A7	c200 F6
2267 E3	3272 B1	c201 G4
2270 B4	3273 B1	c202 G4
2271 B4	3274 F4	c203 G5
2272 E1	3275 F4	c204 G5
2273 E1	3276 F2	c205 G5
2274 F5	3277 F2	c206 G5
2275 E5	3278 F2	c207 G6
2276 B2	3279 B10	c208 G6
2277 D10	3280 B10	c209 G6
2278 E7	3281 B10	c210 G5
2279 A6	3282 B10	c211 G6
2280 A6	3283 B10	
2281 F1	3284 A7	
2282 B9	3285 D9	
2283 F4	3286 B2	
2284 F3	3287 B8	
2285 F5	3288 F2	
2286 F3	3289 B4	
2287 F4	3290 A9	
2288 A2	3291 A1	
2289 A3	3292 A7	
2290 E7	3293 A7	
3200 A2	3294 A9	
3201 B9	3295 G5	
3202 A6	3296 F9	
3203 E9	3297 F5	
3204 A6	3298 B7	
3205 D9	3299 B2	
3206 E9	4207 B1	
3207 B6	4209 G1	

Mono Carrier: Features & Connectivities

A5 FEATURES & CONNECTIVITIES



1213	MTV	ITV
1	I2SWS	ITV DATA OUT/SDA
2	I2SCLK	ITV DATAIN
3	I2SDI1	ITV CLOCK
4	GND	GND
5	Light sensor	ITV SCL
6	C	ITV POR 1
7	Stdby-con	Stdby-con

1206	DVD	iDTV	USB	PCMCIA	ATSC
A	-	-	-	-	-
B	Power On	Power On	Power On	Power On	Power On
C	Bus Request	Bus Request	Bus Request	Bus Request	Reset #
D	Rx	-	Rx	Rx	Rx
E	Tx	-	Tx	Tx	Tx

1212	ATSC
1	-
2	-
3	-
4	Y
5	GND
6	U
7	GND
8	V
9	-
10	-
11	-
12	-

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120107

Mono Carrier: Class D - Audio Amplifier

A6 CLASS D - AUDIO AMP

A6

MAIN_OUTL A4
MAIN_OUTR A4
VOL_MUTE A4
For SUB Woofer And For ITV
7901-1 LM393N
7901-2 LM393N
7902 TDA8925J
CLASS-D AMPLIFIER
7903 BC847B
7904 BC857B
6901 BAS316
6904 BZX384-C27
6905 P0102DA
6906 BAV99
7906 BC327-25
VALUE MRT
RES
VT_Supply
Vaux_GND
Audio_Gnd
Vaudio+
Vaudio-
+Vaudio
-Vaudio
+9VB
V_DG
Vaudio+1
-V
-9V1
-15V6
-2V8
1V6
1V5
1V0
10V7
10V5
3975 A7
1902 C9 4910 B9
1903 A7 4911 C7
2928 A2 4912 D7
2929 E2 4913 B7
2930 A2 4914 F8
2931 A2 4915 F8
2932 B2 4916 F8
2933 B2 4917 F8
2934 B2 5901 C7
2935 E2 5902 D7
2936 D2 5907 C8
2937 E2 5908 D8
2938 F2 5910 B7
2939 E2 5911 C7
2942 C4 5912 D7
2945 D5 5913 A8
2946 D5 5914 B7
2947 B5 6901 D2
2948 B5 6903 A9
2949 B5 6904 E3
2950 A5 6905 B5
2951 A5 6906 A6
2952 C6 7901-1 B3
2953 D6 7901-2 E3
2954 D7 7902 C5
2955 C7 7903 D3
2957 C8 7904 C2
2958 C8 7906 A8
2960 C4 9910 A7
2961 A5 9911 A7
2963 B6 9913 A8
2970 D7 9914 B7
2971 D7 9915 B7
2972 E7
2973 E8
2974 E8
2977 A4
2978 B8
2979 B8
2980 C8
2981 E7
2982 C8
2983 E8
2984 C8
3930 A2
3931 A2
3932 B2
3933 B2
3934 B3
3935 B3
3936 E2
3937 E2
3938 E2
3939 F2
3940 F3
3941 F3
3942 B4
3943 C4
3945 E9
3946 D2
3947 C3
3948 D2
3949 C4
3952 C6
3953 D6
3955 C7
3956 C8
3957 D9
3958 A5
3959 C3
3960 B5
3961 C3
3962 C2
3964 B8
3965 A8
3971 D7
3972 E9
3973 A3
3974 C4

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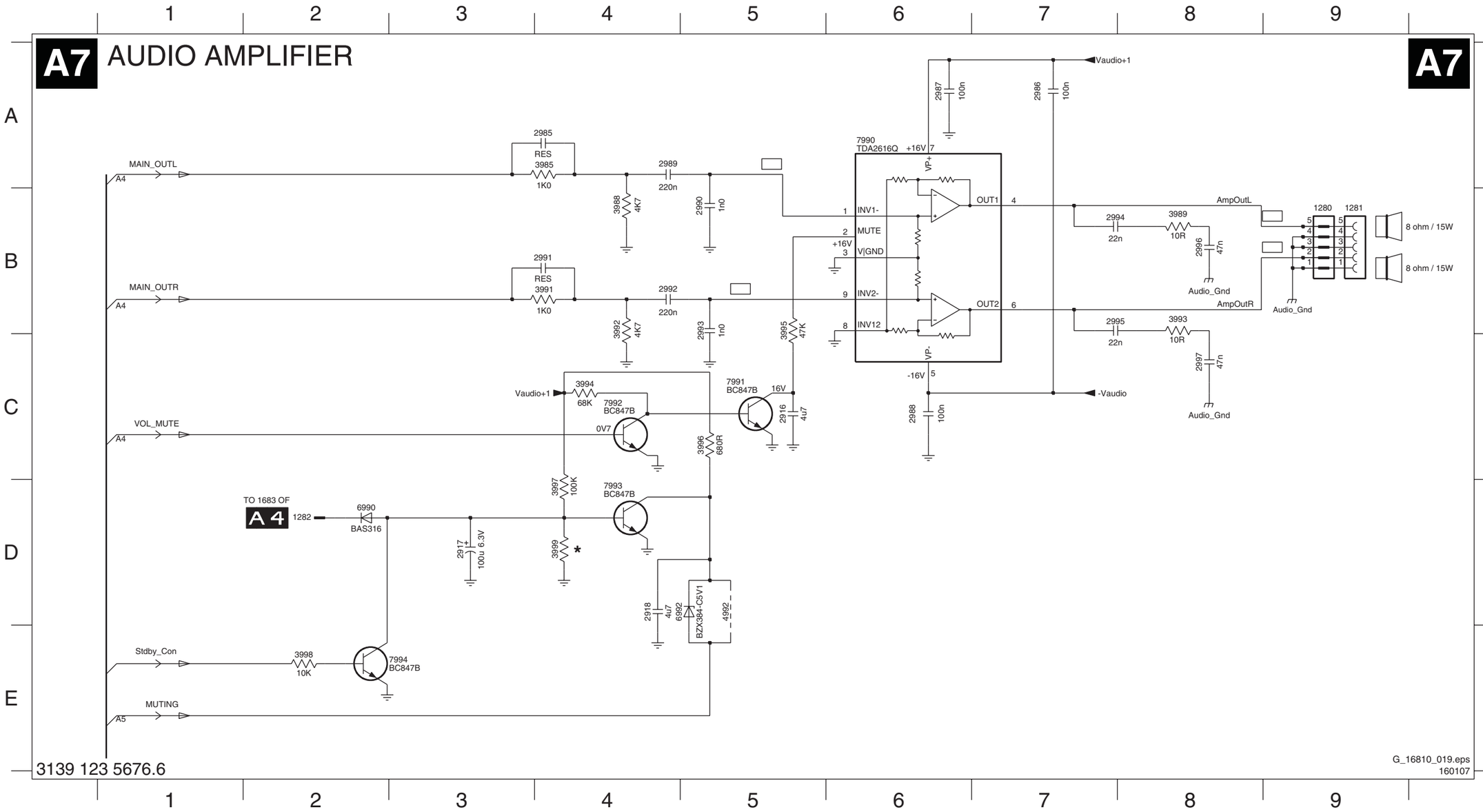
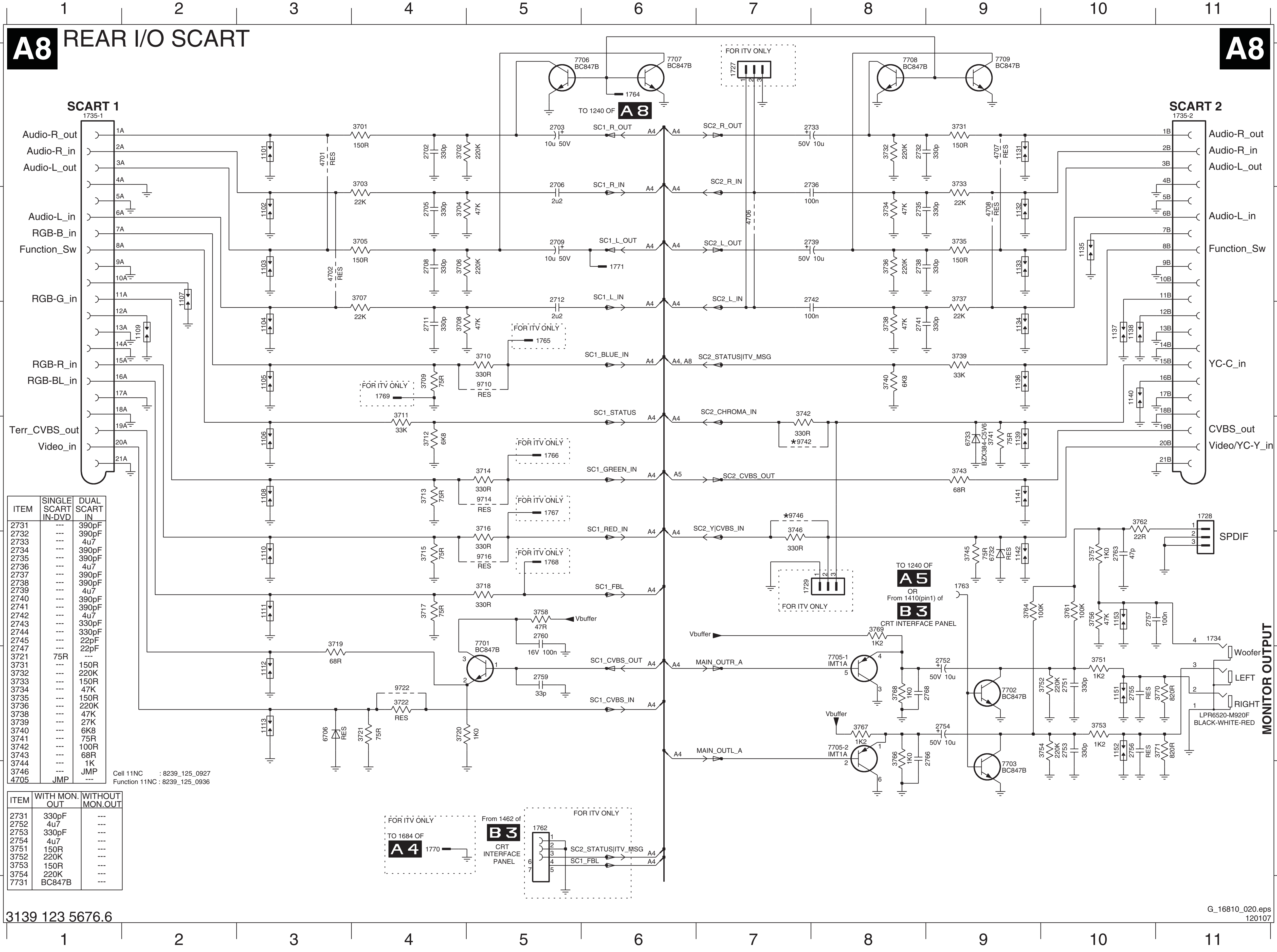
3139 123 5676.6

Mono Carrier: Audio Amplifier



Mono Carrier: Rear I/O Scart



ITEM	SINGLE SCART IN-DVD	DUAL SCART IN
2731	---	390pF
2732	---	390pF
2733	---	4u7
2734	---	390pF
2735	---	390pF
2736	---	4u7
2737	---	390pF
2738	---	390pF
2739	---	4u7
2740	---	390pF
2741	---	390pF
2742	---	4u7
2743	---	330pF
2744	---	330pF
2745	---	22pF
2747	---	22pF
3721	75R	---
3731	---	150R
3732	---	220K
3733	---	150R
3734	---	47K
3735	---	150R
3736	---	220K
3738	---	47K
3739	---	27K
3740	---	6K8
3741	---	75R
3742	---	100R
3743	---	68R
3744	---	1K
3746	---	JMP
4705	JMP	---

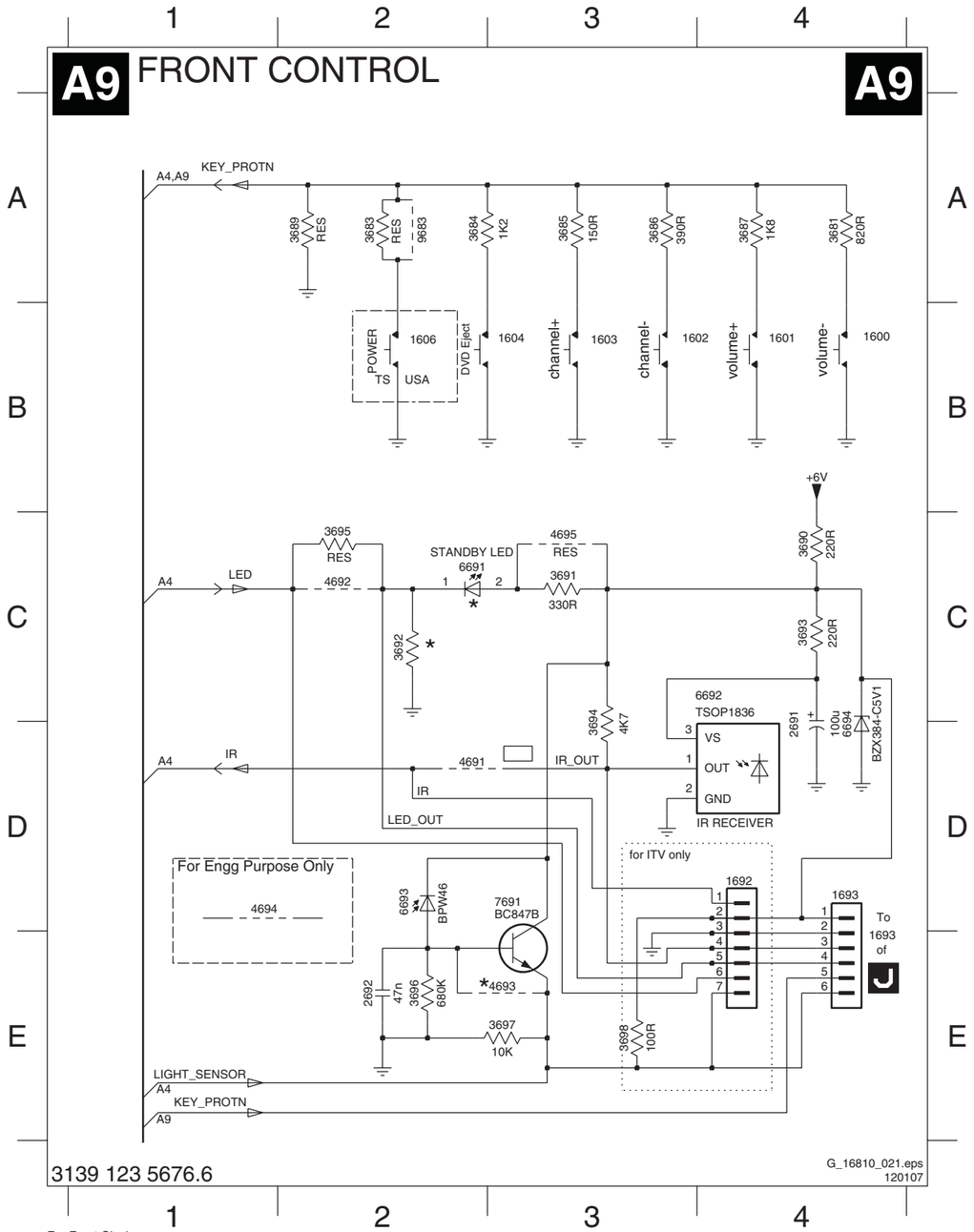
Cell 11NC : 8239_125_0927
Function 11NC : 8239_125_0936

ITEM	WITH MON. OUT	WITHOUT MON.OUT
2731	330pF	---
2752	4u7	---
2753	330pF	---
2754	4u7	---
3751	150R	---
3752	220K	---
3753	150R	---
3754	220K	---
7731	BC847B	---

3139 123 5676.6

1101 A3
1102 B3
1103 B3
1104 C3
1105 C3
1106 D3
1107 B2
1108 D3
1109 C2
1110 E3
1111 E3
1112 F3
1113 F3
1131 A9
1132 B9
1133 B9
1134 C9
1135 B10
1136 C9
1137 C10
1138 C10
1139 D9
1140 C10
1141 D9
1142 E9
1151 F10
1152 F10
1153 E10
1727 A7
1728 D11
1729 E7
1734 E11
1735-1 A1
1735-2 A11
1762 G5
1763 E9
1764 A6
1765 C5
1766 D5
1767 D5
1768 E5
1769 C4
1770 G4
1771 B6
2702 A4
2703 A5
2705 B4
2706 B5
2708 B4
2709 B5
2711 C4
2712 C5
2732 A8
2733 A8
2735 B8
2736 B8
2738 B8
2739 B8
2741 C8
2742 C8
2751 F10
2752 F9
2753 F10
2754 F9
2755 F10
2756 F10
2757 E10
2759 F5
2760 E5
2763 E10
2766 F9
2768 F9
3701 A4
3702 A4
3703 A4
3704 B4
3705 B4
3706 B4
3707 B4
3708 C4
3709 C4
3710 C5
3711 D4
3712 D4
3713 D4
3714 D5
3715 E4
3716 D5
3717 E4
3718 E5
3719 F3
3720 F4
3721 F4
3722 F4
3731 A9
3732 A8
3733 A9
3734 B8
3735 B9
3736 B8
3737 B9
3738 C8
3739 C9
3740 C8
3741 D9
3742 C7
3743 D9
3745 E9
3746 E7
3751 F10
3752 F10
3753 F10
3754 F10
3756 E10
3757 E10
3758 E5
3761 E10
3762 D10
3764 E9
3766 F8
3767 F8
3768 F8
3769 E8
3770 F11
3771 F11
4701 A3
4702 B3
4706 B7
4707 A9
4708 B9
6706 F3
6732 E9
6733 D9
7701 E5
7702 F9
7703 G9
7705-1 F8
7705-2 F8
7706 A6
7707 A6
7708 A8
7709 A9
9710 C5
9714 D5
9716 E5
9722 F4
9742 D7
9746 D7

Mono Carrier: Front Control



1600 B4
1601 B4
1602 B3
1603 B3
1604 B3
1606 B2
1692 D4
1693 D4
2691 D4
2692 E2
3681 A4
3683 A2
3684 A2
3685 A3
3686 A3
3687 A4
3689 A2
3690 C4
3691 C3
3692 C2
3693 C4
3694 D3
3695 C2
3696 E2
3697 E3
3698 E3
4691 D2
4692 C2
4693 E3
4694 D1
4695 C3
6691 C2
6692 C3
6693 D2
6694 D4
7691 D3
9683 A2

3139 123 5676.6

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For Front Cinch

ITEM	Mono Set GL	Mono Set EU	Stereo Set GL	Stereo Set EU
0218	---	---	YES	YES
0227	YES	Yes	---	---
2184	2u2	4u7	2u2	4u7
2185	---	390p	---	390p
2186	---	390p	---	390p
3813	150R	150R	150R	150R
3814	47K	47K	47K	47K
3185	---	---	150R	150R
3186	---	---	47K	47K

HEADPHONE

ITEM	Mono HP	Stereo HP
9982	JMP	---

Note that for Non-Headphone set, non of the components are in

FRONT CONTROL

ITEM	AP	EU	LATAM	NAFTA
3692	---	1K	---	---

FRONT CONTROL

ITEM	PAINTER LEADER	PAINTER PLUS
3681	470R	390R
3682	3K9	3K3
3683	270R	390R
3684	470R	560R
3685	560R	560R
3686	1K8	1K5

Personal Notes:

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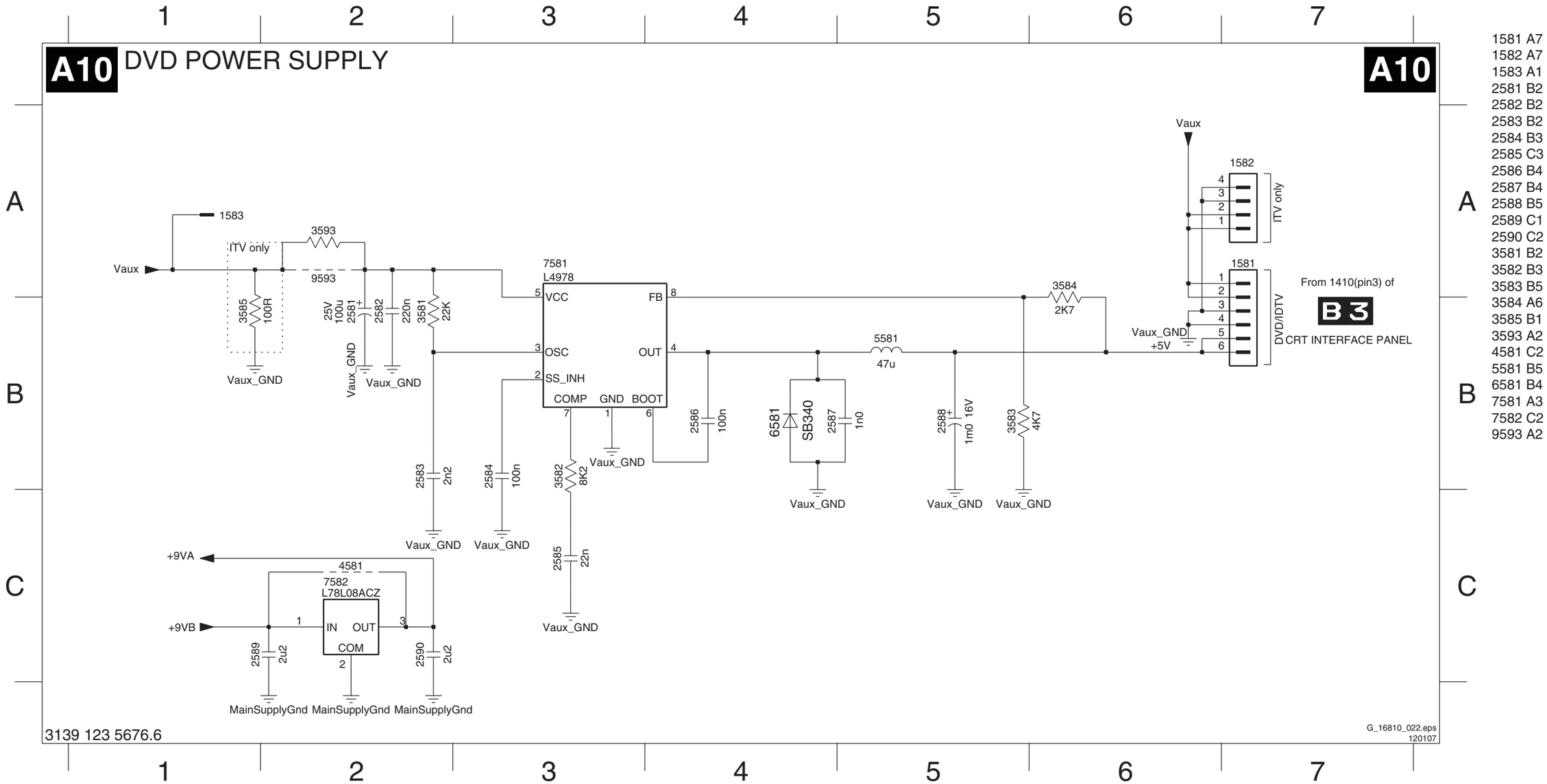
131004

Mono Carrier: DVD Power Supply



1581 A7
1582 A7
1583 A1
2581 B2
2582 B2
2583 B2
2584 B3
2585 C3
2586 B4
2587 B4
2588 B5
2589 C1
2590 C2
3581 B2
3582 B3
3583 B5
3584 A6
3585 B1
3593 A2
4581 C2
5581 B5
6581 B4
7581 A3
7582 C2
9593 A2

Layout Mono Carrier: (Top Side)

1000 E7 1206 D4 1240 D4 1452 A7 1508 A2 1601 C1 1729 D7 1771 C7 2240 E5 2415 A5 2459 A7 2502 C2 2535 C3 2561 C4 2703 C7 3020 E6 3249 D6 3402 A7 3433 B6 3466 C7 3501 B1 3514 A4 3563 C3 3617 C6 3713 D7 3739 D7 3961 C3 5405 B5 5512 B4 5602 D7 6404 A6 6481 B7 6573 B5 9278 D4 9690 E4
1001 E5 1207 E6 1241 D5 1453 B5 1509 C1 1602 D1 1734 D7 1902 D1 2250 D6 2416 B6 2460 A7 2503 A3 2536 C3 2562 B4 2709 C7 3200 E7 3252 D5 3407 A7 3434 B6 3467 C7 3502 A1 3515 A4 3571 B5 3618 C6 3714 D7 3741 D7 3962 D3 5406 B5 5512C B4 5901 D1 6406 A5 6486 C6 6575 A4 9279 D4 9694 E6
1002 E5 1208 D6 1242 E4 1454 B7 1510 B1 1603 D1 1735 D7 1903 D3 2251 E5 2417 A5 2463 C7 2504 A4 2537 C3 2563 C4 2733 C7 3201 D5 3258 D6 3411 A6 3440 C5 3468 C7 3503 B1 3516 A4 3574 B5 3633 C6 3715 D7 3742 D7 3975 D3 5408 B5 5512D B4 5902 D2 6410 A6 6491 A6 6581 D3 9280 D5 9695 E4
1003 E5 1212 C6 1243 C6 1470 A7 1532 B3 1604 C1 1762 D7 2005 E5 2265 E6 2418 A5 2465 C7 2505 A3 2539 C3 2565 C4 2739 C7 3213 E7 3260 D5 3412 A5 3441 B6 3470 C7 3504 B2 3519 B4 3575 B5 3639 E4 3716 D7 3743 D7 5201 D5 5410 B6 5531 B3 5907 D1 6411 A6 6500 A3 6691 A1 9290 E6 9696 D4
1004 E7 1213 D5 1245 D6 1500 A2 1535 C4 1606 A1 1763 E7 2006 E7 2273 E6 2419 B5 2467 C7 2506 A3 2540 C3 2570 B4 2752 E7 3215 D5 3270 D7 3414 C5 3442 A7 3471 C7 3505 A1 3520 A4 3577 B5 3642 D6 3717 D7 3745 D7 5208 D6 5450 B7 5532 B3 5908 D2 6412 A6 6511 A5 6692 B1 9294 C6 9710 D7
1005 E7 1219 C7 1280 E3 1501 A2 1542 C4 1682 D4 1764 C7 2008 E7 2275 E6 2427 B6 2481 A7 2507 A3 2541 C2 2581 C4 2754 E7 3224 E5 3274 D7 3415 B6 3443 A7 3472 C7 3506 B1 3521 A5 3584 C4 3683 B1 3718 D7 3746 D7 5216 D6 5451 B7 5536 C3 5913 D3 6452 C7 6535 C3 6693 B1 9296 C4 9714 D7
1010 E7 1220 E4 1281 E3 1502 B2 1543 C4 1683 C4 1765 C7 2203 D5 2404 B6 2451 A7 2484 A7 2508 C2 2542 B4 2588 C3 2945 D2 3230 D4 3275 E7 3417 A5 3447 A7 3482 B7 3507 B2 3523 B2 3585 D4 3701 C7 3721 D7 3751 E7 5217 D7 5452 A7 5537 C4 5914 D3 6453 B6 6536 C3 6905 D1 9297 C4 9716 D7
1011 E7 1221 C5 1282 D3 1503 C2 1545 C4 1684 D6 1766 D7 2217 E5 2405 A6 2452 B7 2486 B6 2509 C1 2543 B3 2611 E4 2948 D2 3231 D6 3276 C7 3418 C5 3451 B6 3483 B7 3508 A3 3529 B3 3589 C5 3703 C7 3722 D7 3753 E7 5295 C5 5500 B2 5551 B4 6001 E7 6454 B7 6537 C3 7203 E4 9298 C4 9720 D7
1012 E6 1222 D3 1401 C6 1504 C2 1581 D3 1692 C1 1767 D7 2218 D6 2406 A6 2454 A7 2492 B6 2511 A5 2545 B3 2621 E5 2949 D2 3234 C6 3277 C7 3425 C5 3454 A7 3484 B7 3509 B2 3531 B3 3593 C4 3705 C7 3731 C7 3757 D7 5401 A6 5501 B2 5552 B5 6006 E7 6455 B7 6540 B3 7204 E4 9299 C5 9721 D7
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1204 C5 1234 D5 1404 A5 1506 A2 1583 D3 1727 C7 1769 D7 2230 D6 2412 A6 2457 C7 2500 A2 2528 B3 2551 B4 2631 D7 2961 D1 3241 E5 3291 D6 3431 C5 3460 B7 3497 C5 3511 B5 3534 B3 3606 E4 3709 D7 3735 C7 3943 C2 5403 B5 5503 A3 5562 B4 6401 A6 6459 B7 6562 B4 7405 B6 9402 B5 9723 D7
1205 D5 1235 E6 1451 C7 1507 C2 1600 C1 1728 D7 1770 D7 2234 D6 2413 B6 2458 C6 2501 C2 2534 B3 2552 C5 2691 B1 2978 C3 3246 D5 3401 C6 3432 B6 3461 C7 3500 B1 3513 A4 3542 B3 3616 C6 3710 D7 3737 C7 3945 D2 5404 B7 5511 A4 5581 D3 6403 C6 6480 B7 6563 C4 7406 C5 9404 B7 9724 D7
7451 C7 9407 B6 9728 D7
7452 C7 9410 B6 9729 D7
7453 C7 9417 A5 9742 D7
7512 A4 9442 A7 9746 D7
7513 B5 9443 A7 9910 C3
7531 B3 9451 B7 9911 D3
7571 B5 9452 A7 9913 D3
7581 D4 9460 B6 9914 D3
7582 D4 9466 B5 9915 C3
7601 D5 9467 B6 9920 D3
7603 E4 9469 C5 9921 D3
7605 E4 9470 C6 9924 D2
7902 C2 9473 C5 9926 D3
7906 C3 9474 C5 9927 D2
7990 E3 9475 C5 9933 D3
9002 E6 9476 C5 9935 D2
9201 E6 9477 C5 9936 C3
9202 E4 9478 C6 9937 C3
9203 E6 9479 C6 9939 D3
9204 E6 9480 C6 9940 C3
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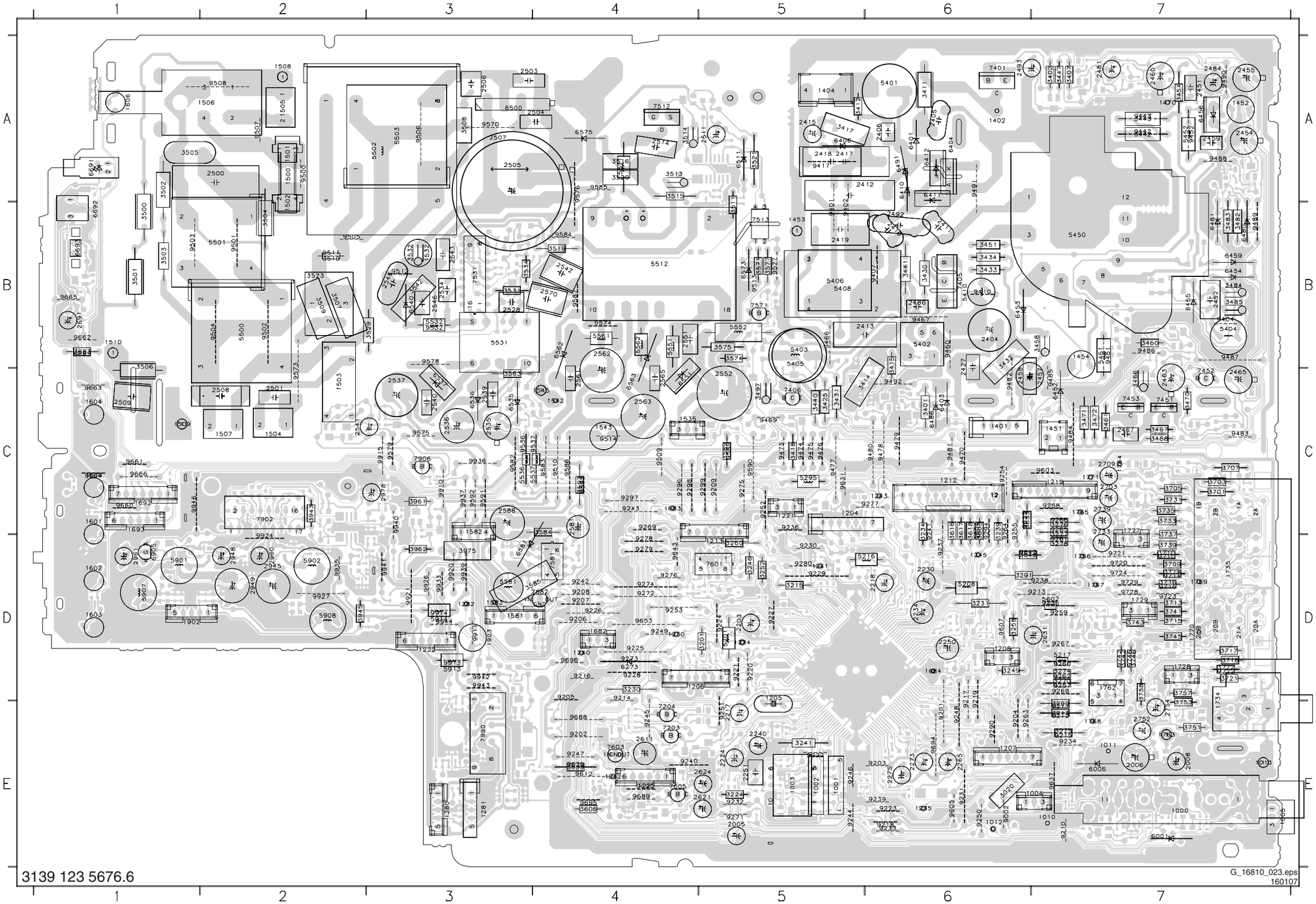
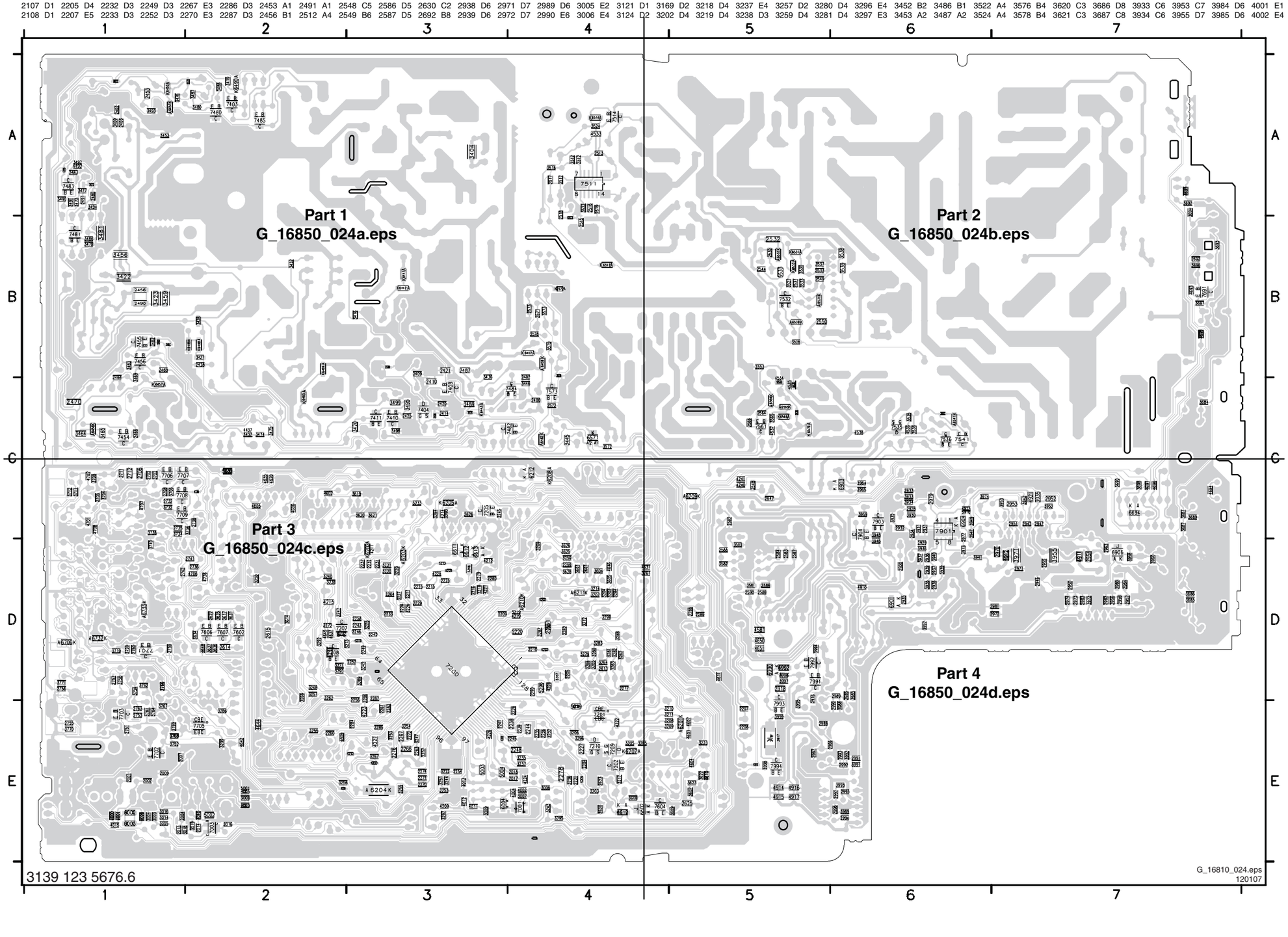


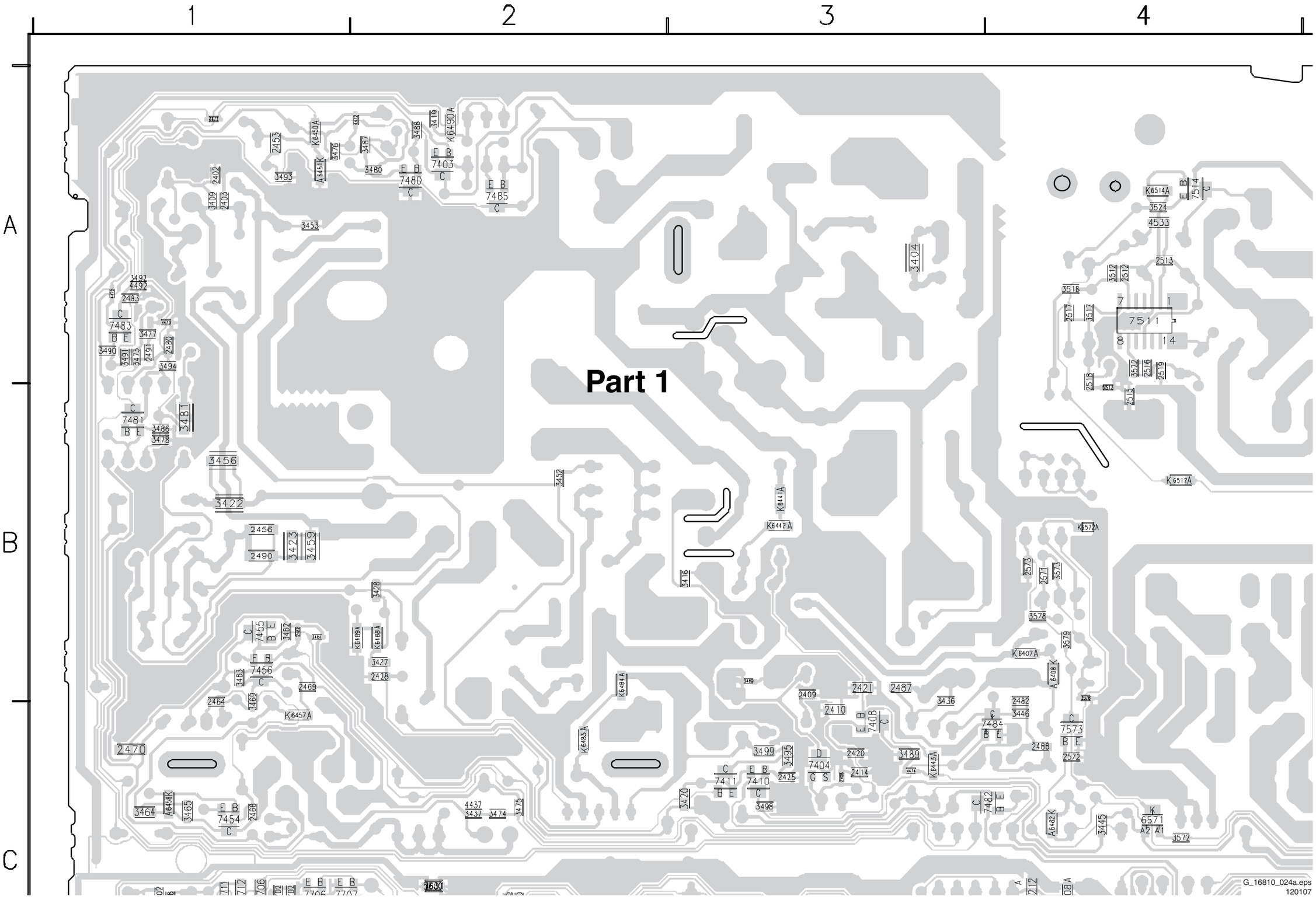
Layout Mono Carrier (Overview Bottom Side) (Old Mapping)

2001 E1 2122 D1 2208 E5 2235 E4 2253 E3 2271 E3 2288 D5 2461 B2 2513 A4 2550 B6 2589 D5 2916 D6 2942 C7 2973 D7 2991 E6 3007 E4 3126 D2 3203 E4 3220 D3 3240 D3 3261 D5 3282 D4 3298 D4 3462 B1 3488 A2 3527 B5 3579 B4 3622 E5 3689 C8 3935 C7 3956 D7 3986 D6 4003 E2 5004 E4 7483 A1
2002 E1 2124 D2 2209 D4 2236 E4 2254 E3 2272 E3 2289 D5 2462 B2 2515 B4 2553 B5 2590 D5 2917 E5 2946 D7 2974 D7 2992 E6 3008 E2 3129 C1 3204 D4 3221 D3 3242 D3 3262 D4 3283 D4 3299 E2 3463 B1 3489 C3 3528 B5 3581 D5 3623 E5 3690 C7 3936 D6 3957 D6 3988 E6 4004 E4 5202 D4 7484 C4
2003 E2 2126 D1 2210 D4 2237 D3 2255 E2 2274 E3 2290 D4 2464 C1 2516 A4 2564 C5 2601 D4 2918 D5 2947 C7 2977 C7 2993 E6 3009 E4 3130 C1 3205 E4 3222 E3 3243 E4 3263 D4 3284 D4 3404 A3 3464 C1 3490 A1 3530 B6 3582 D5 3625 D4 3691 A8 3937 D6 3958 D8 3989 E6 4005 E2 5203 D4 7511 A4
2004 E2 2127 D1 2211 D3 2238 E4 2256 D3 2276 E3 2402 A1 2468 C1 2517 A4 2566 C5 2602 D4 2928 C6 2950 D7 2979 C6 2994 E6 3010 E2 3132 C1 3206 E4 3223 E5 3244 E3 3264 D4 3285 E5 3405 A2 3465 C1 3491 A1 3533 B6 3583 D5 3626 D4 3692 A8 3938 D6 3959 C6 3991 E6 4006 E1 5205 D3 7514 A4
2007 E2 2131 C1 2215 D3 2239 E4 2257 E3 2277 D4 2403 A1 2469 B2 2518 A4 2571 B4 2613 D4 2929 D6 2951 C7 2980 D8 2995 E6 3014 E2 3134 C1 3207 D4 3225 D3 3245 C4 3265 D4 3286 E2 3409 A1 3469 C1 3492 A1 3535 C6 3601 D4 3628 D4 3693 B8 3939 D6 3960 D8 3992 E6 4010 E2 5206 D3 7532 B5
2009 E2 2133 C1 2221 E4 2241 E4 2258 D3 2278 E4 2408 C3 2470 C1 2519 A4 2572 C4 2614 D2 2930 D6 2952 C7 2981 D7 2996 E6 3016 E2 3135 C1 3208 E5 3226 D3 3247 E3 3266 D4 3287 D4 3416 B3 3473 A1 3493 A1 3536 C6 3604 D4 3631 D2 3694 A8 3940 D6 3964 C6 3993 E6 4011 E3 5207 D4 7535 C6
2013 E2 2136 C1 2222 E4 2242 D3 2259 D4 2279 D4 2409 B3 2480 A1 2530 B5 2573 B4 2615 D2 2931 C6 2953 C7 2982 D7 2997 E6 3018 E2 3136 C1 3209 E5 3227 D3 3248 D2 3267 E3 3288 D4 3420 C3 3474 C2 3494 A1 3537 B6 3605 D4 3634 D2 3695 B8 3941 D7 3965 C6 3994 D6 4012 E3 5209 E4 7536 C6
2014 E2 2137 D1 2223 D3 2243 D3 2260 E3 2280 D4 2410 B3 2482 B4 2531 B5 2574 C6 2617 D2 2932 C6 2954 D7 2983 D7 2998 E6 3019 E2 3156 E1 3210 E5 3228 D3 3250 D2 3268 D2 3289 D3 3427 B2 3475 C2 3495 C3 3538 B6 3607 E5 3635 D2 3696 B8 3942 C7 3971 D7 3995 E5 4013 E3 5210 D3 7541 C7
2016 E2 2157 E1 2225 D3 2244 E4 2261 E3 2281 D4 2414 C3 2483 A1 2532 B5 2575 A4 2620 E4 2933 C6 2955 D7 2984 D7 3000 E1 3104 D2 3161 D1 3211 E5 3229 D3 3251 E3 3269 D4 3290 C3 3428 B2 3476 A2 3498 C3 3539 B6 3608 E4 3636 D2 3697 B8 3946 D6 3972 D7 3996 D5 4015 E1 5211 E3 7561 C5
2017 E4 2158 E1 2226 E4 2245 E4 2262 D3 2282 D4 2420 C3 2487 B3 2533 B6 2582 C5 2622 D2 2934 C6 2957 D8 2985 D6 3001 E1 3106 E2 3162 E1 3212 D4 3232 E4 3253 E3 3271 D3 3292 D3 3436 B4 3477 A1 3499 C3 3541 C6 3609 E5 3637 D2 3698 C8 3947 C7 3973 D7 3997 D5 4101 D1 5212 E3 7573 C4
2018 E4 2159 E2 2227 E4 2246 D3 2263 E3 2283 E3 2421 B3 2488 C4 2538 C5 2583 D5 2623 E4 2935 D6 2958 D7 2986 E6 3002 E1 3111 D1 3164 D1 3214 D4 3233 C3 3254 E3 3272 D3 3293 D3 3437 C2 3478 B1 3512 A4 3565 C5 3610 E5 3681 C8 3930 C6 3948 C6 3974 C7 3998 E5 4102 D1 5213 D3 7602 D2
2103 D2 2163 E1 2229 D3 2247 D3 2264 D3 2284 E3 2425 C3 2489 B3 2544 B5 2584 D5 2625 E5 2936 D6 2963 D7 2987 E6 3003 E2 3113 D1 3166 E1 3216 D3 3235 E4 3255 E3 3273 D3 3294 C3 3445 C4 3480 A2 3517 A4 3572 C4 3614 D2 3684 C8 3931 C6 3949 C7 3982 E6 3999 E5 4103 D1 5214 E4 7604 E5
2104 E2 2204 E4 2231 D3 2248 E4 2266 E3 2285 E3 2428 B2 2490 B1 2547 C5 2585 D5 2626 C3 2937 D6 2970 D7 2988 E6 3004 E1 3115 D1 3168 D2 3217 E4 3236 E4 3256 E3 3279 D4 3295 E4 3446 C4 3481 B1 3518 A4 3573 B4 3619 C3 3685 D8 3932 C6 3952 C7 3983 E6 4000 E1 4104 C1 5219 E4 7606 D2
2107 D1 2205 D4 2232 D3 2249 D3 2267 E3 2286 D3 2453 A1 2491 A1 2548 C5 2586 D5 2630 C2 2938 D6 2971 D7 2989 D6 3005 E2 3121 D1 3169 D2 3218 D4 3237 E4 3257 D2 3280 D4 3296 E4 3452 B2 3486 B1 3522 A4 3576 B4 3620 C3 3686 D8 3933 C6 3953 C7 3984 D6 4001 E1 4105 D1 5220 D4 7607 D2
2108 D1 2207 E5 2233 D3 2252 D3 2270 E3 2287 D3 2456 B1 2512 A4 2549 B6 2587 D5 2692 B8 2939 D6 2972 D7 2990 E6 3006 E4 3124 D2 3202 D4 3219 D4 3238 D3 3259 D4 3281 D4 3297 E3 3453 A2 3487 A2 3524 A4 3578 B4 3621 C3 3687 C8 3934 C6 3955 D7 3985 D6 4002 E4 4106 D1 5296 D4 7691 B8

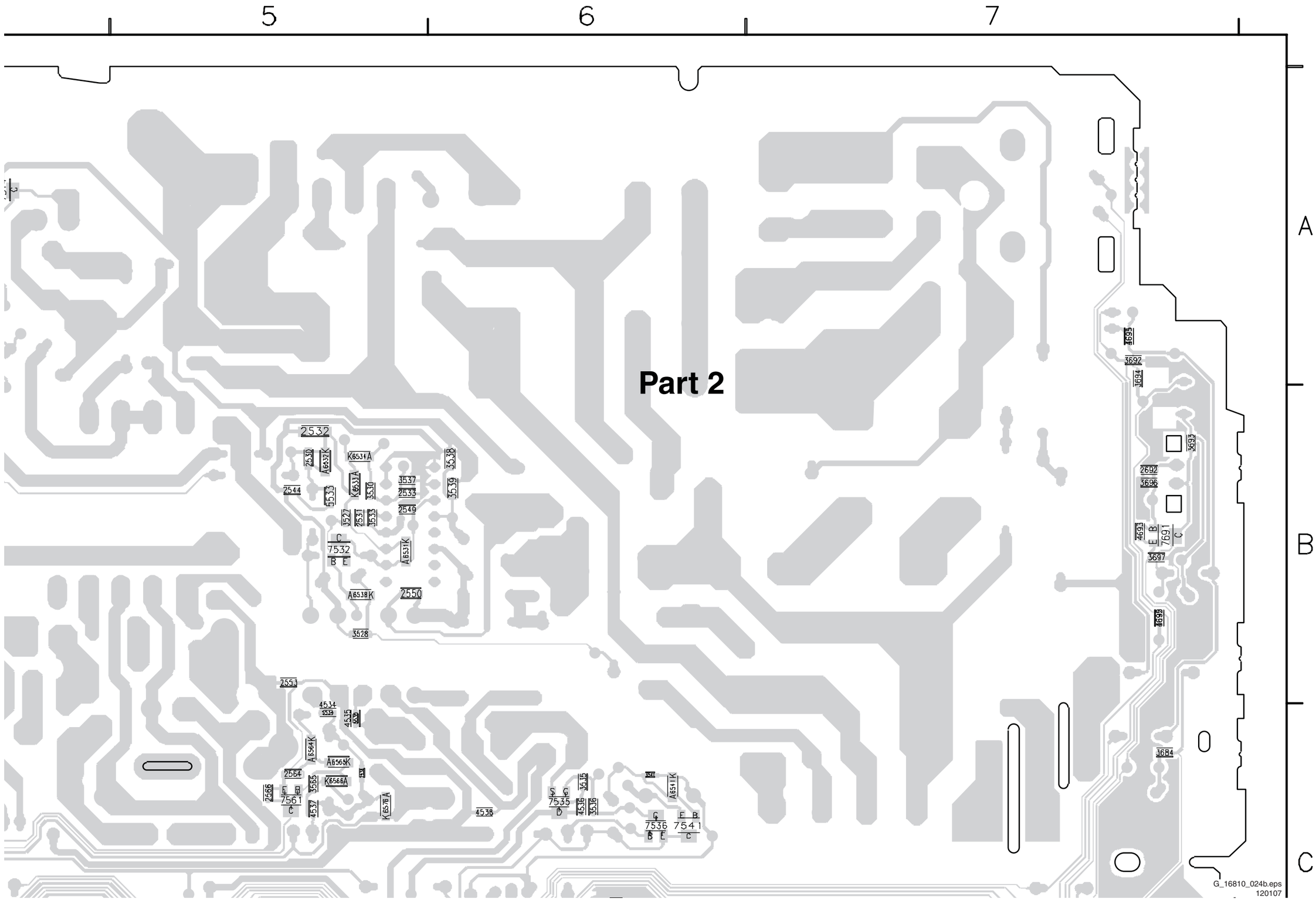
4107 D1 5513 B4 7901 C6
4108 D1 5533 B5 7903 C6
4109 D1 5534 C5 7904 C6
4110 D1 5535 C5 7991 D6
4111 D1 5601 C2 7992 D6
4112 C2 5910 C7 7993 E5
4113 C2 5911 D7 7994 E5
4115 D2 5912 D7
4116 C1 6002 E1
4117 E1 6003 E1
4118 D2 6004 E4
4130 C1 6106 D1
4136 C1 6107 C1
4144 D2 6132 C1
4207 D3 6201 E5
4209 E3 6202 D3
4211 D3 6203 D3
4212 D4 6204 E3
4213 D3 6205 C3
4214 C3 6207 E4
4215 D3 6208 C4
4219 D4 6209 C5
4220 E3 6210 D4
4221 D4 6211 D4
4222 E4 6212 C4
4223 E3 6407 B4
4224 E4 6408 B4
4225 D3 6441 B3
4226 E4 6442 B3
4227 E3 6443 C4
4228 D4 6450 A2
4240 C5 6451 A2
4241 C5 6457 C2
4437 C2 6458 C1
4470 A1 6482 C4
4474 C3 6483 B3
4477 A1 6484 B3
4492 A1 6488 B2
4493 C2 6489 B2
4533 A4 6512 B4
4534 C5 6514 A4
4535 C5 6531 B6
4536 C6 6532 B5
4537 C5 6533 B5
4538 C6 6534 B5
4581 D5 6538 B5
4601 E5 6541 C6
4602 C3 6564 C5
4604 E5 6565 C5
4605 C2 6566 C5
4606 C2 6571 C4
4607 E5 6572 B4
4609 E3 6576 C6
4610 E5 6602 E5
4611 D5 6610 E4
4612 E4 6611 D3
4620 C2 6612 D3
4630 C2 6613 D3
4631 D5 6694 C8
4635 C2 6901 D6
4637 D3 6903 C6
4642 E2 6904 C7
4644 E2 6906 D7
4645 D3 6990 D5
4646 D4 6991 D6
4648 D2 6992 D5
4649 E5 7001 E4
4650 D5 7003 E2
4651 D5 7103 E2
4691 C8 7104 D2
4692 B8 7200 D3
4693 B8 7201 E4
4694 C8 7202 E4
4695 A8 7205 C4
4696 C8 7207 D3
4910 D6 7208 D3
4911 D7 7209 E4
4912 D7 7210 E4
4913 C7 7402 A2
4914 E5 7403 A2
4915 E5 7404 C3
4916 E5 7408 C3
4917 E5 7410 C3
4921 C7 7411 C3
4984 D6 7454 C1
4991 D6 7455 B1
4992 D5 7456 B1
5001 E2 7480 A2
5002 E2 7481 B1
5003 E4 7482 C4



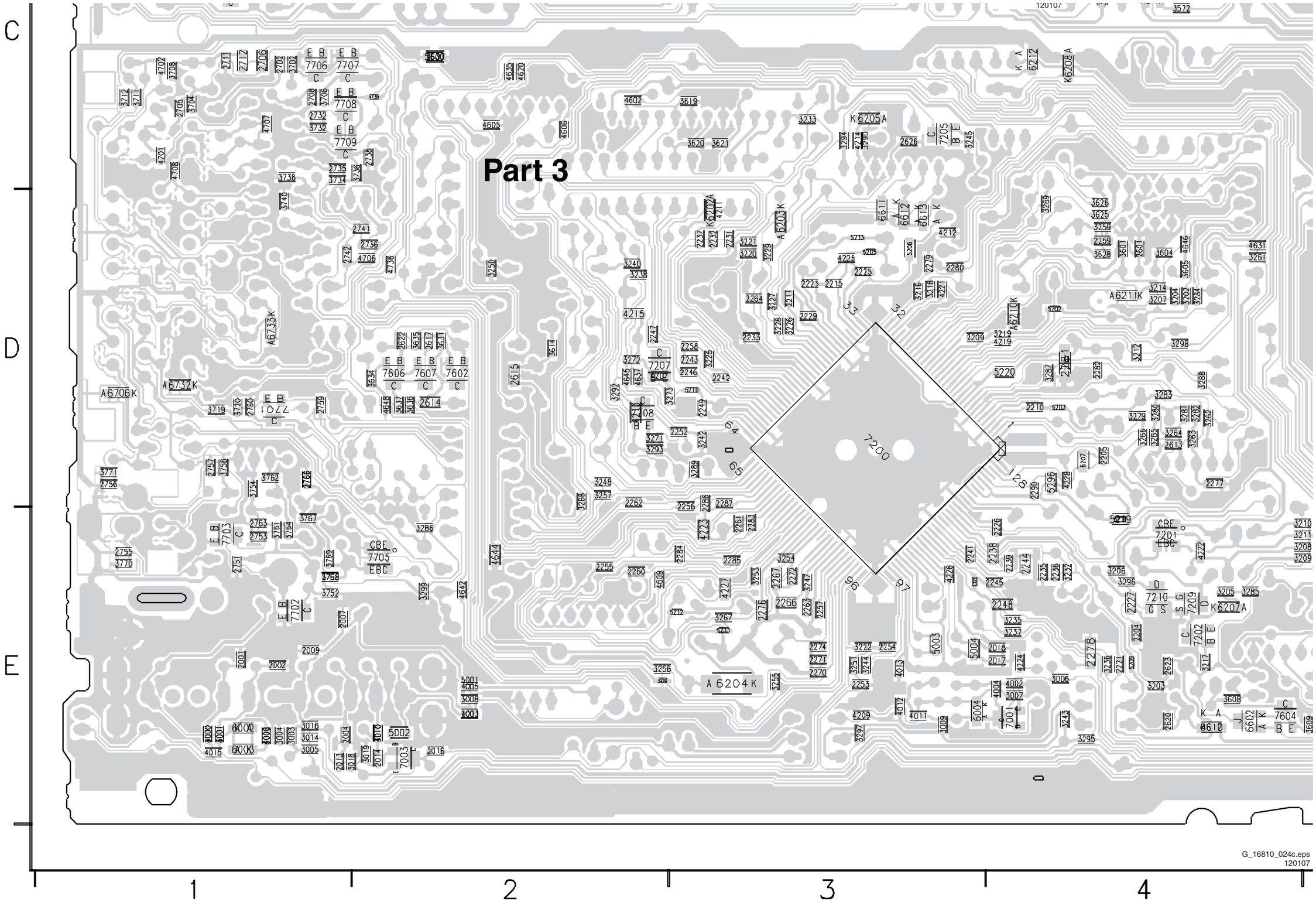
Layout Mono Carrier (Part 1 Bottom Side)



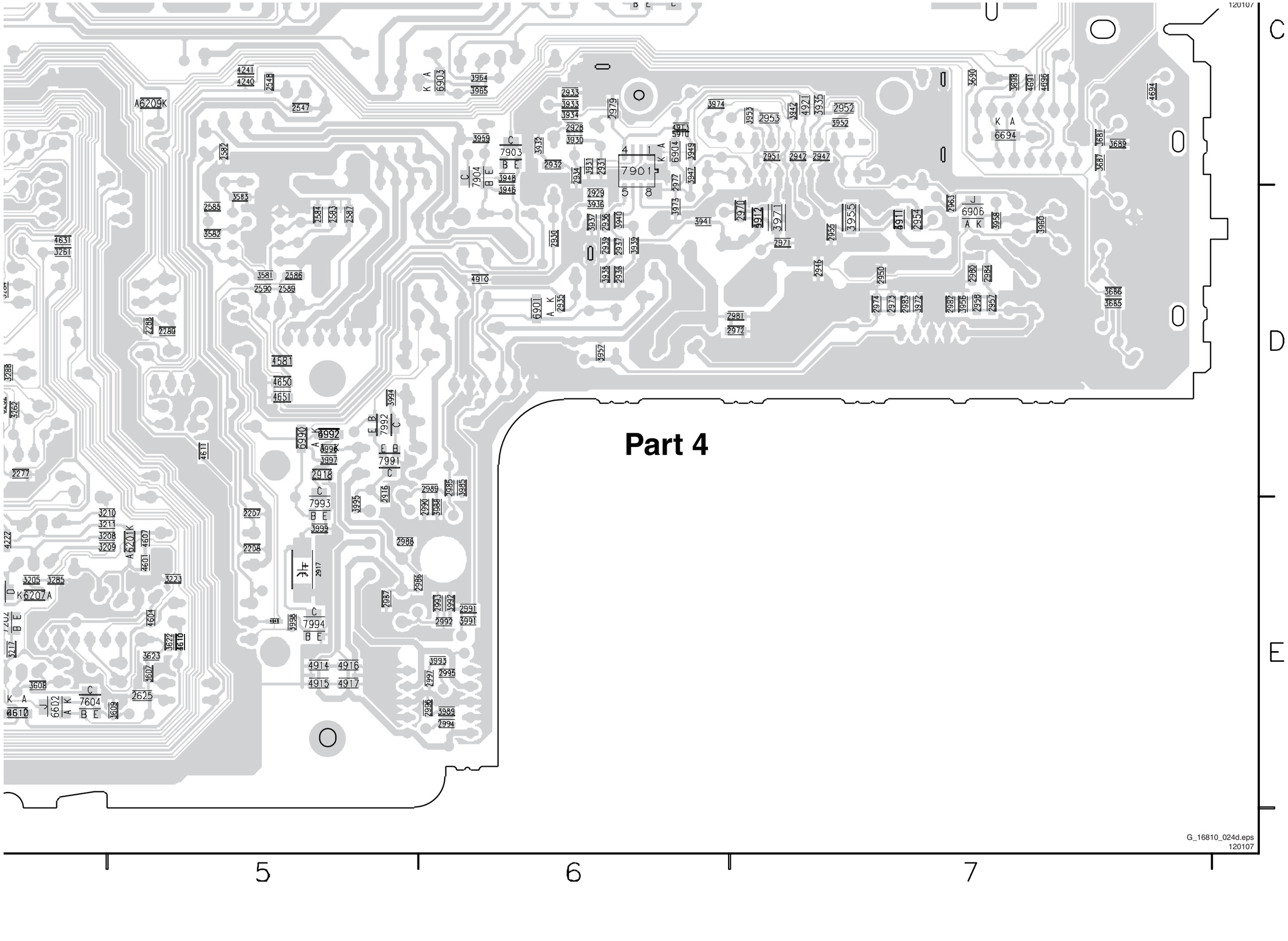
Layout Mono Carrier (Part 2 Bottom Side)



Layout Mono Carrier (Part 3 Bottom Side)



Layout Mono Carrier (Part 4 Bottom Side)



CRT Panel

B1 CRT PANEL

ITEM	EUROPE	
	RGB+DISPL-21RF.28WS-EU & RGB+DISPL-24WR.25.28BLD-EU	RGB+DISPL-29RF-EU & RGB+DISPL-24WR.28.32WR-EU
3328	---	---
3329	---	---
3330	---	---
3337	---	---
4328	JMP	JMP
4329	JMP	JMP
4330	JMP	JMP
4337	---	---
5351	---	IND FXD LAL04 A 22U PM10
9351	JMP	---

0330 MECHPART

+200VA

7330 Vdd IN1 IN2 IN3 2V5 3k77 3k75 Vref 188k7 A1 A2 A3 BC1 BC2 BC3 OUT1 OUT2 OUT3 140V THERMAL PROTECTION BCI 7V GND

2330 100n 2334 10n 2333 1n

6333 6332 6331 BAV21

4329 3329 4328 3328 4330 3330 100R

3333 3335 3331 100R

3334 3336 3332 1K

2332 1n5

EHTb 3356 10R 1332 AQUADAG WIRE

CRT Sockets

1255 1256-A 1254-A

G1 CG G2 CR H1 H2 CB GND G3

GND_CRT

2331 10n 3357 2354 10n 3358

2352 680p 2353 3n3

3354 1K5

5352 27u

9351 5351

+200V +200VA Filament

2335 10n 3351 100R 2351 10u 5330

T0 CRT SOCKET

Blue Green Red

CRT

NOT USED

T0 CRT SOCKET

1352 VG2 FOCUS EHT

FROM LOT, MAIN CHASSIS A2 LINE + FRAME DEFLECTION

1331

From 1204 of A5 Features & Connectivities OR From 1431 of B3 CRT INTERFACE PANEL

BC_INFO

4337 3337

6338 2336 4336

ROT SVM VSVM B2

1351

From 1401 of A2 Line + Frame Deflection OR From 1466 of B3 CRT INTERFACE PANEL

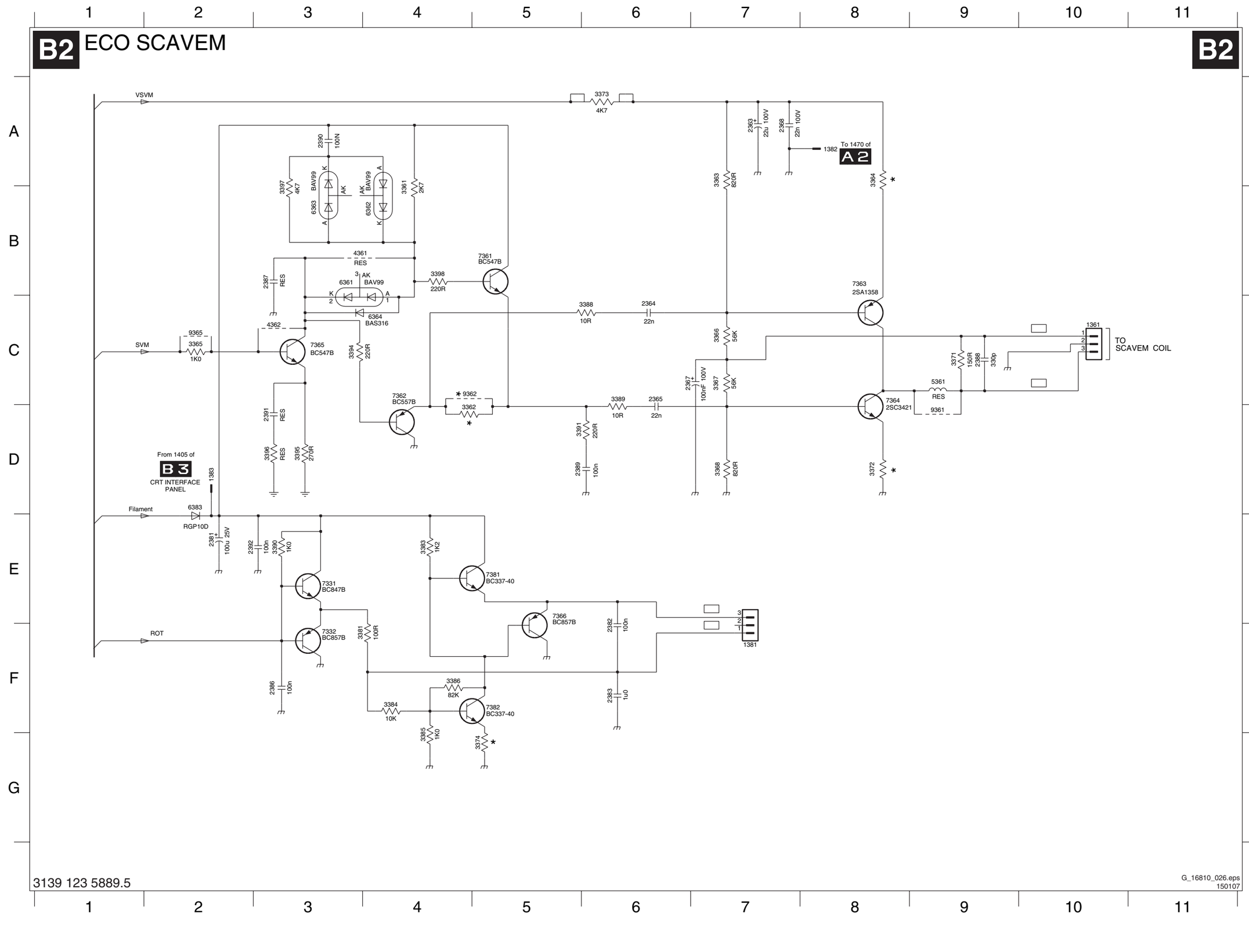
EHTb

3139 123 5889.5

G_16810_025.eps 150107

CRT Panel: Eco Scavem

B2 ECO SCAVEM



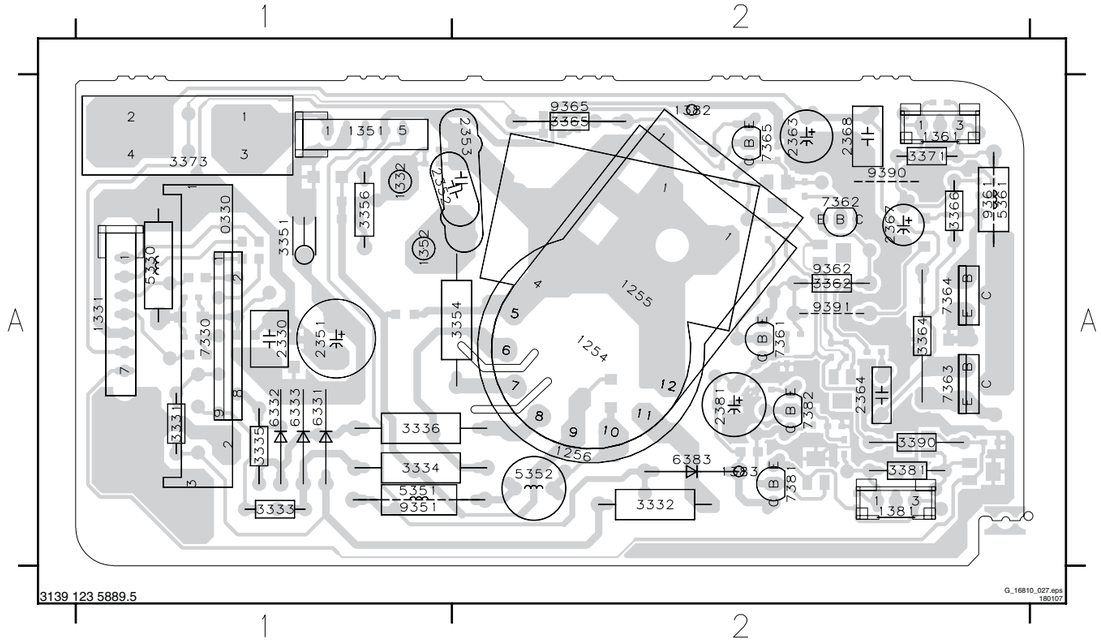
1361 C10
1381 F7
1382 A8
1383 D2
2363 A7
2364 C6
2365 C6
2367 C6
2368 A7
2381 E2
2382 F6
2383 F6
2386 F3
2387 B3
2388 C9
2389 D5
2390 A3
2391 D3
2392 E2
3361 B4
3362 D4
3363 A7
3364 A8
3365 C2
3366 C7
3367 C7
3368 D7
3371 C9
3372 D8
3373 A6
3374 G5
3381 F3
3383 E4
3384 F4
3385 G4
3386 F4
3388 C6
3389 C6
3390 E3
3391 D5
3394 C3
3395 D3
3396 D3
3397 B3
3398 B4
4361 B3
4362 C3
5361 C9
6361 B3
6362 B4
6363 B3
6364 C4
6383 D2
7331 E3
7332 F3
7361 B5
7362 C4
7363 B8
7364 C8
7365 C3
7366 E5
7381 E5
7382 F5
9361 D9
9362 C4
9365 C2

3139 123 5889.5

G_16810_026.eps
150107

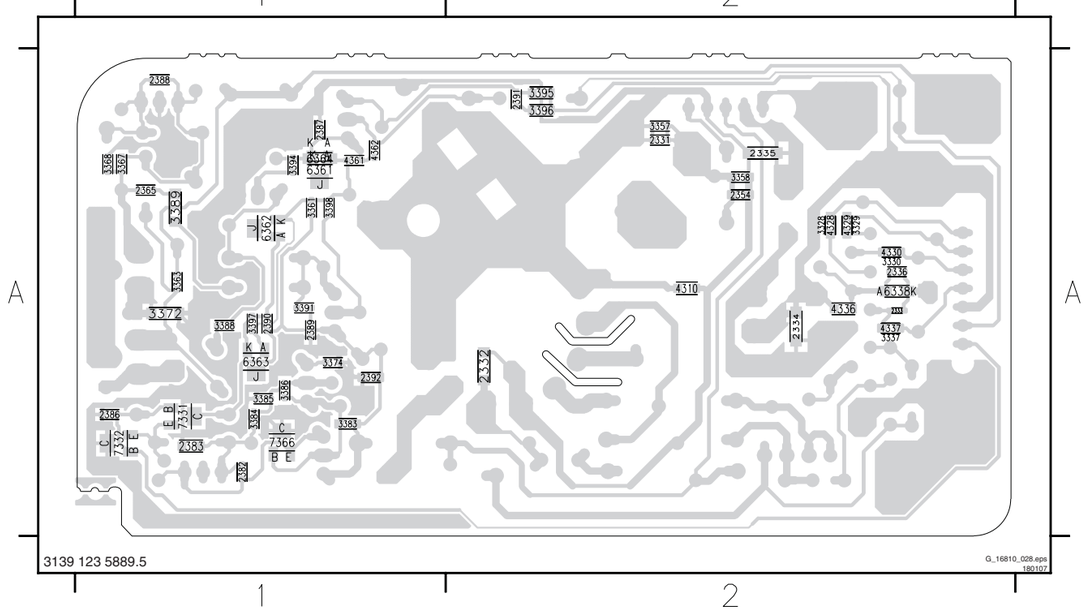
Layout CRT Panel (Top Side)

0330 A1	1331 A1	1361 A2	2330 A1	2363 A2	2381 A2	3334 A1	3354 A2	3365 A2	3381 A2	5352 A2	6333 A1	7362 A2	7381 A2	9362 A2
1254 A2	1332 A1	1381 A2	2351 A1	2364 A2	3331 A1	3335 A1	3356 A1	3366 A2	3390 A2	5361 A2	6383 A2	7363 A2	7382 A2	9365 A2
1255 A2	1351 A1	1382 A2	2352 A2	2367 A2	3332 A2	3336 A1	3362 A2	3371 A2	5330 A1	6331 A1	7330 A1	7364 A2	9351 A1	9390 A2
1256 A2	1352 A1	1383 A2	2353 A2	2368 A2	3333 A1	3351 A1	3364 A2	3373 A1	5351 A1	6332 A1	7361 A2	7365 A2	9361 A2	9391 A2



Layout CRT Panel (Bottom Side)

2331 A2	2382 A1	2392 A1	3363 A1	3386 A1	3398 A1	4362 A1	7366 A1	F339 A1	F360 A2	I332 A2	I355 A1	I369 A1	I388 A1	
2332 A1	2383 A1	3328 A2	3367 A1	3388 A1	4310 A2	6338 A2	7331 A1	F340 A1	F361 A1	I333 A2	I357 A2	I371 A1	I389 A1	
2333 A2	2386 A1	3329 A2	3368 A1	3389 A1	4328 A2	6361 A1	7332 A2	F341 A1	F362 A1	I334 A2	I360 A2	I372 A1	I390 A1	
2334 A2	2387 A1	3330 A2	3372 A1	3391 A1	4329 A2	6362 A1	7333 A2	F351 A2	F363 A1	I335 A2	I361 A1	I381 A1	I391 A1	
2335 A2	2388 A1	3337 A2	3374 A1	3394 A1	4330 A2	6363 A1	7334 A2	F352 A2	F381 A1	I336 A1	I362 A1	I383 A1	I392 A2	
2336 A2	2389 A1	3357 A2	3383 A1	3395 A1	4336 A2	6364 A1	F335 A2	F353 A2	F382 A1	I337 A2	I364 A1	I385 A1		
2354 A2	2390 A1	3358 A2	3384 A1	3396 A1	4337 A2	7331 A1	F336 A2	F354 A2	I330 A2	I351 A2	I366 A1	I386 A1		
2365 A1	2391 A1	3361 A1	3385 A1	3397 A1	4361 A1	7332 A1	F338 A2	F356 A1	I331 A2	I353 A1	I368 A1	I387 A1		



Side I/O + Headphone Panel (PV2)

SIDE AV PANEL + HP PANEL

D

1251 LAP5100-1411F
4180
3155 75R *
9181 *
3154 75R
3159 100R
3158 75R
3160 100R
6161 BZX79-C6V8
SG01
SG02
SG03
SG04
SG08
SG09
SG10
SG11
Video_Gnd
VIDEO IN
* 1277-A
* 1250-C
RIGHT
* 1250-A
3153 *
9152 RES
2173 RES
3152 *
2172 *
* 2175 2u2
* 9175
LEFT
* 1277-B
* 1250-B
3151 150R
2174 RES
3150 47K
2171 330p
* 2180 2u2 50
* 9180
1252
A5 AUDIO_AMPLIFIER
A7 for 2X5W from 1280
A6 for 2X10W from 1902
from Main Chassis
From Main Chassis 1207 Features & Connectivties
1254
HEADPHONE
3156 *
3157 *
2178 470pF
2176 470pF
3161 39K
2181 1u
1232
TO SPEAKER
1278
1279
TO ECO SUB
4181
6162 PDZ33-B
2183 PDZ33-B 6163
Head_Gnd
Sound_Gnd
4182
6164 PDZ33-B
2184 PDZ33-B 6165
Sound_Gnd
Video_Gnd

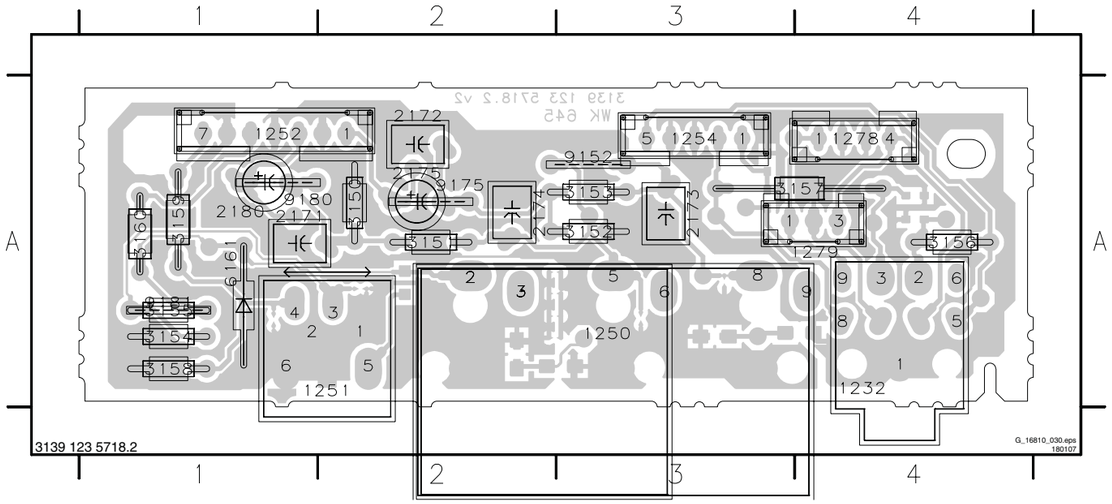
1232 B9
1250-A D1
1250-B E1
1250-C C1
1251 A2
1252 B5
1254 B6
1277-A C1
1277-B E1
1278 B9
1279 B9
2171 E3
2172 D3
2173 D3
2174 E3
2175 C4
2176 C7
2178 B7
2180 D4
2181 D7
2183 D6
2184 D6
3150 E3
3151 D3
3152 D3
3153 C3
3154 B2
3155 B2
3156 B7
3157 C7
3158 A3
3159 A3
3160 B3
3161 C7
4180 B2
4181 D5
4182 D5
6161 B3
6162 D5
6163 D6
6164 D5
6165 E6
9152 D2
9175 C4
9180 E4
9181 B2
SG01 A3
SG02 B2
SG03 E2
SG04 D2
SG08 B3
SG09 B3
SG10 B4
SG11 B4

3139 123 5718.2

G_16810_029.eps
150107

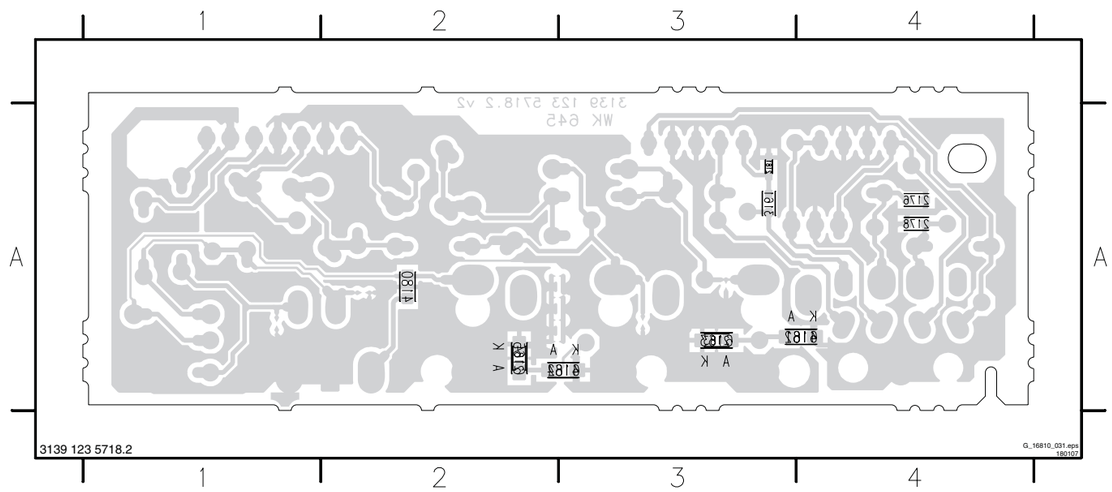
Layout Side I/O + Headphone Panel (PV2) (Top Side)

1232 A4 1252 A1 1278 A4 2172 A2 2175 A2 3151 A2 3154 A1 3157 A4 3160 A1 9175 A2
1250 A3 1254 A3 1279 A4 2173 A3 2180 A1 3152 A3 3155 A1 3158 A1 6161 A1 9180 A1
1251 A2 1277 A2 2171 A1 2174 A2 3150 A2 3153 A3 3156 A4 3159 A1 9152 A3 9181 A1



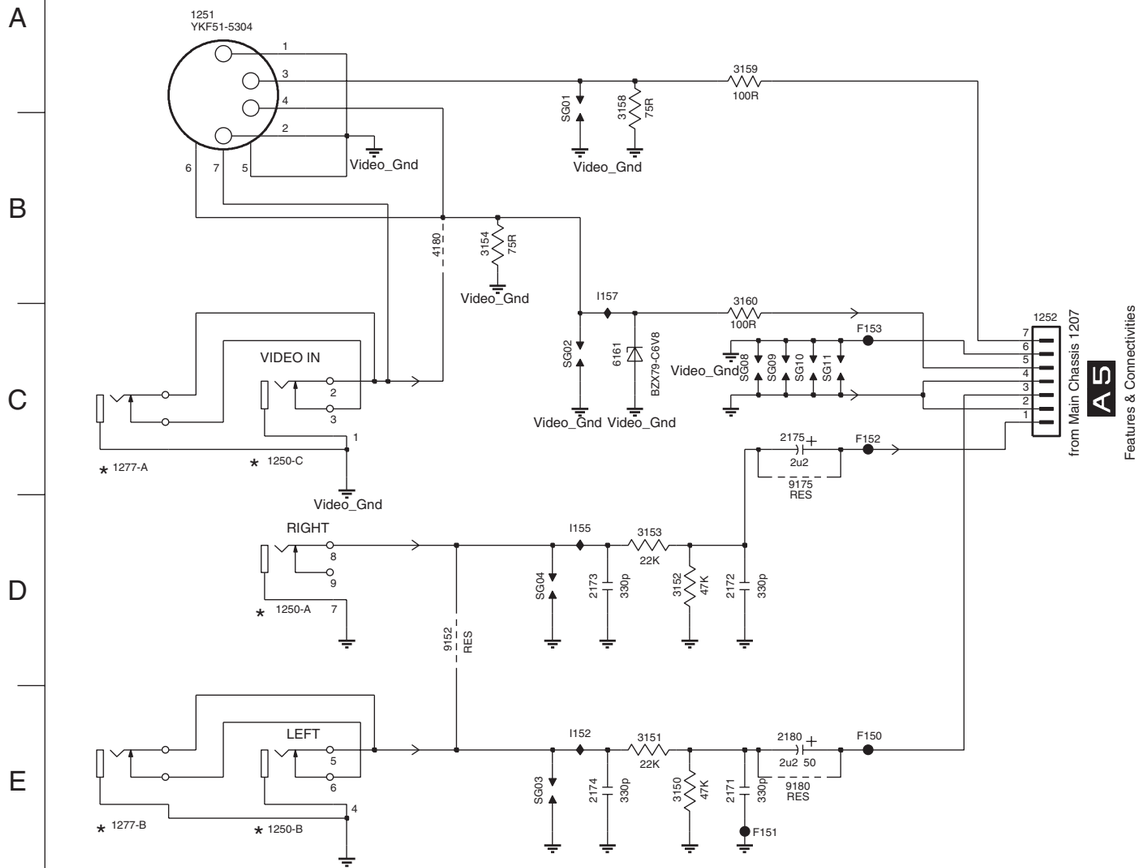
Layout Side I/O + Headphone Panel (PV2) (Bottom Side)

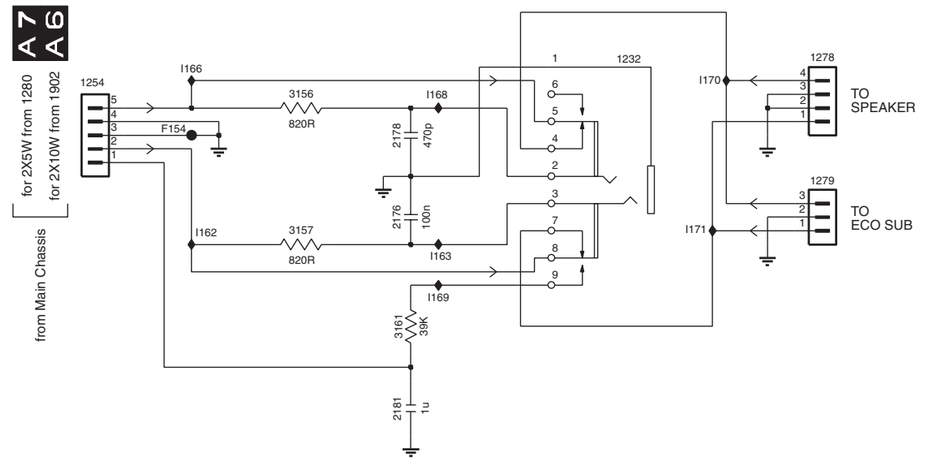
2176 A1 2178 A1 2181 A2 2183 A2 2184 A3 3161 A2 4180 A3 4181 A1 4182 A2 6162 A1 6163 A2 6164 A2 6165 A3

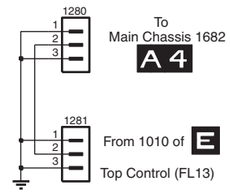


Side I/O + Headphone Panel (FL13)

SIDE I/O PANEL + HP PANEL (FL13)





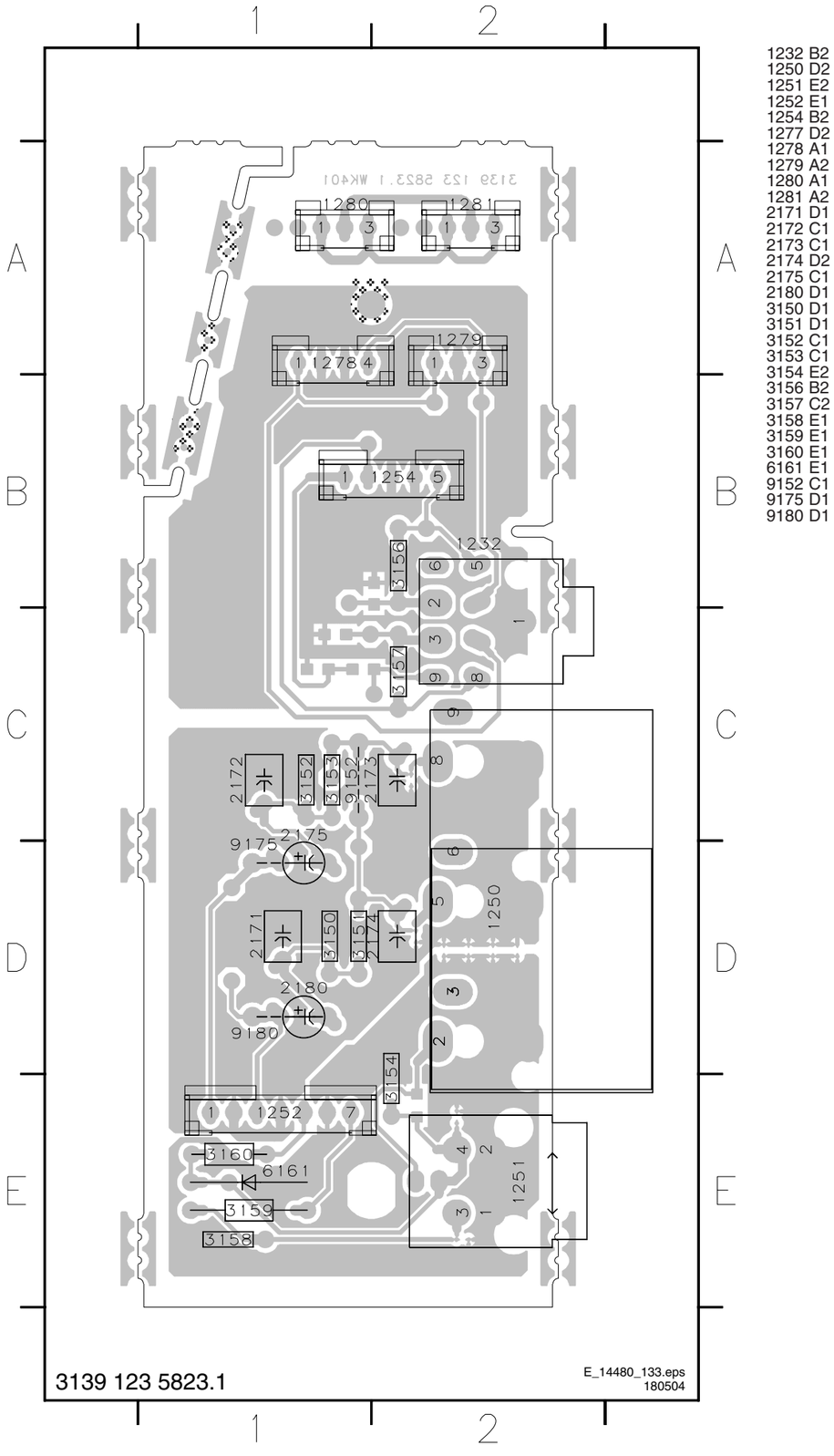


1232 B9
1250-A D1
1250-B E1
1250-C C1
1251 A1
1252 C5
1254 B6
1277-A C1
1277-B E1
1278 B10
1279 B10
1280 D10
1281 E10
2171 E4
2172 D4
2173 D3
2174 E3
2175 C4
2176 C8
2178 B8
2180 E4
2181 D8
3150 E3
3151 E3
3152 D3
3153 D3
3154 B2
3156 B8
3157 C8
3158 A3
3159 A4
3160 C4
3161 C8
4180 B2
6161 C3
9152 D2
9175 C4
9180 E4
F150 E4
F151 E4
F152 C4
F153 C4
F154 B7
I152 E3
I155 D3
I157 B3
I162 C7
I163 C8
I166 B7
I168 B8
I169 C8
I170 B10
I171 C10
SG01 A3
SG02 C3
SG03 E3
SG04 D3
SG08 C4
SG09 C4
SG10 C4
SG11 C4

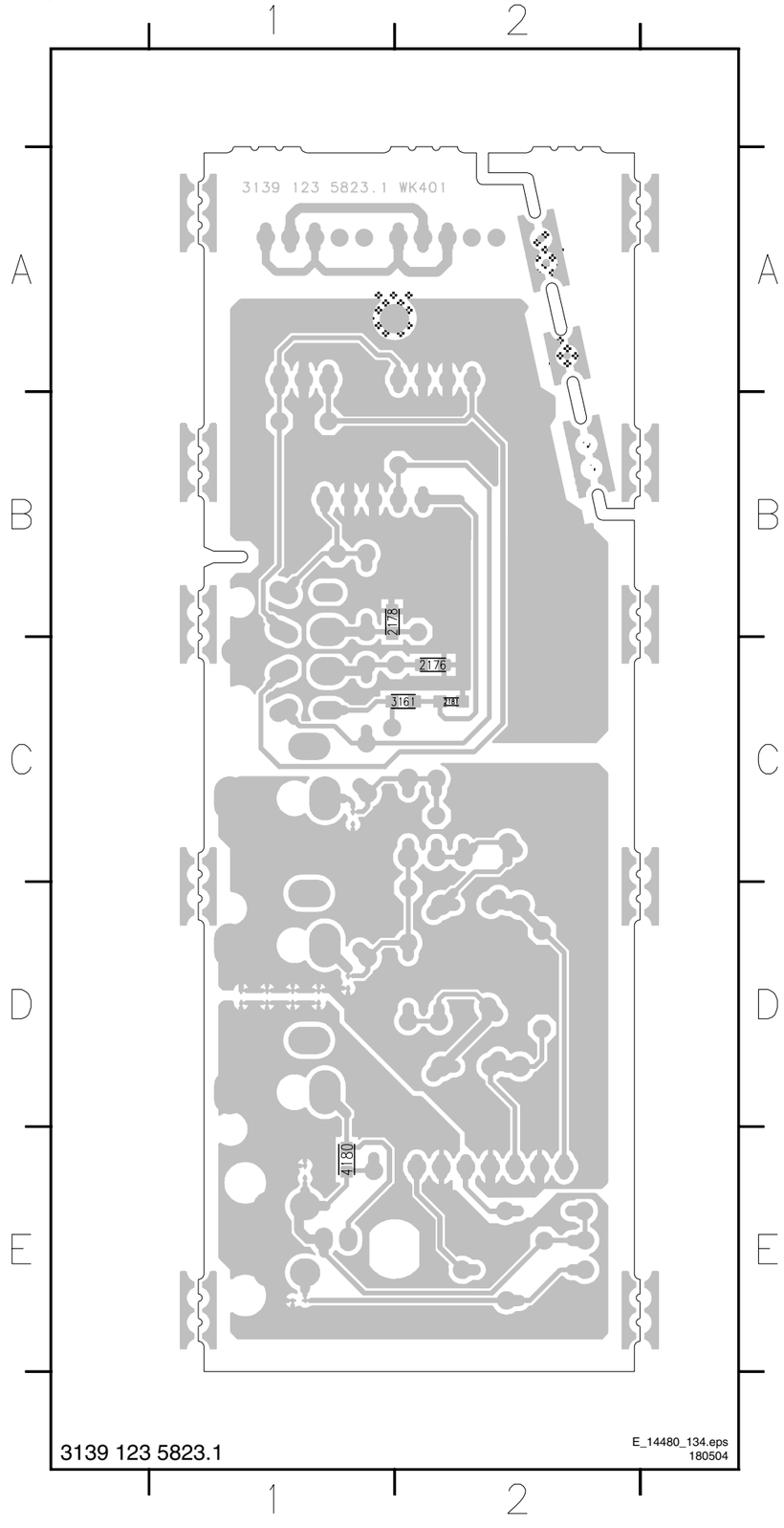
3139 123 5823.1

E_14480_132.eps
131205

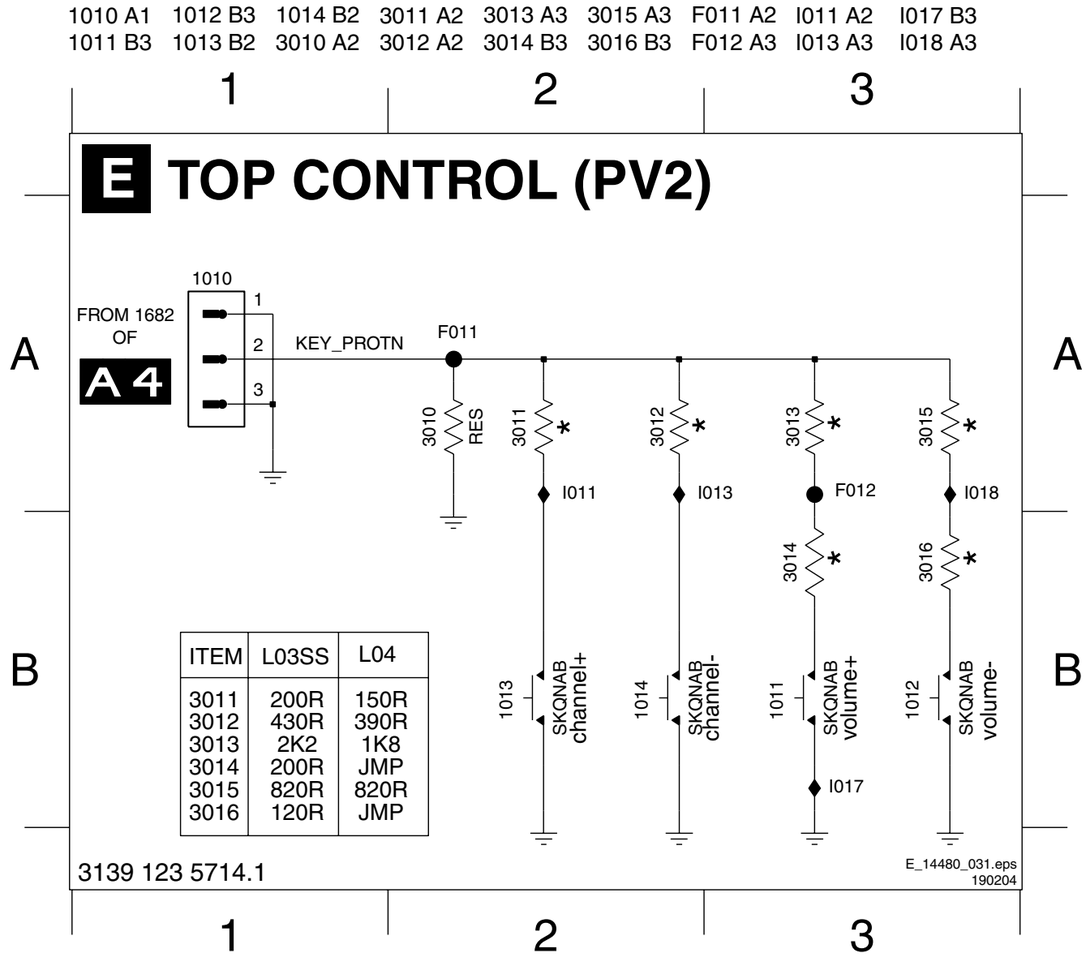
Layout Side I/O + Headphone Panel (FL13) (Top Side)



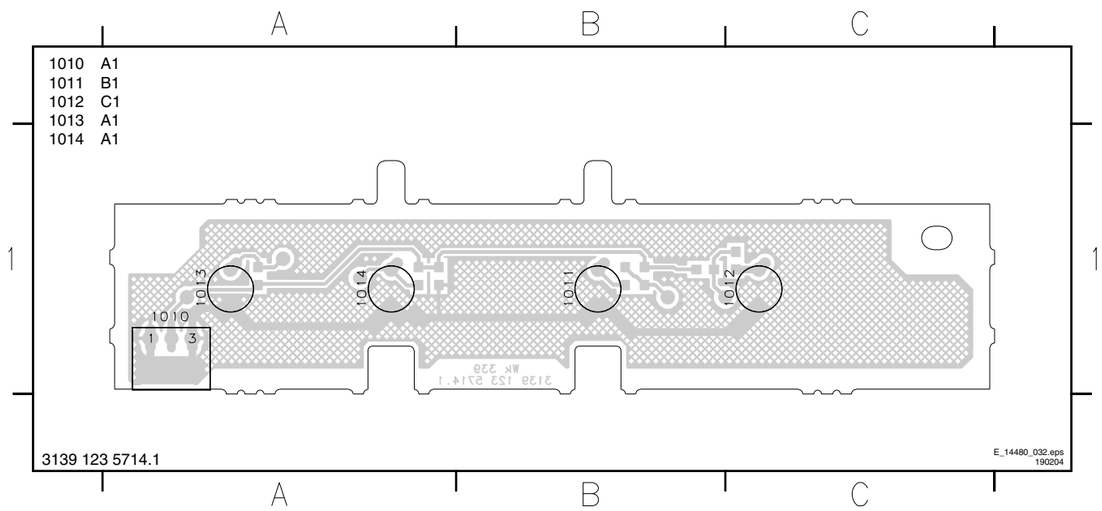
Layout Side I/O + Headphone Panel (FL13) (Bottom Side)



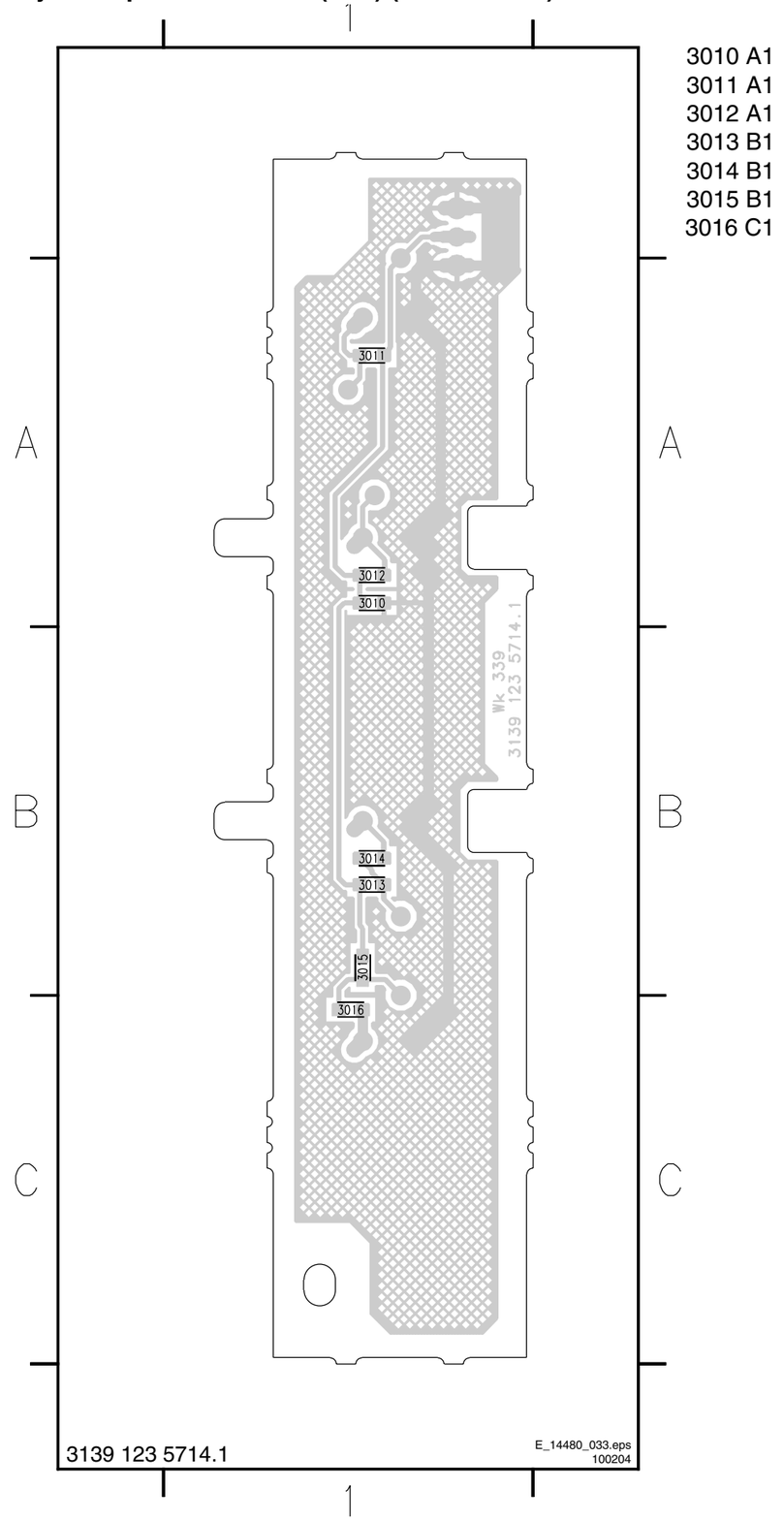
Top Control Panel (PV2)



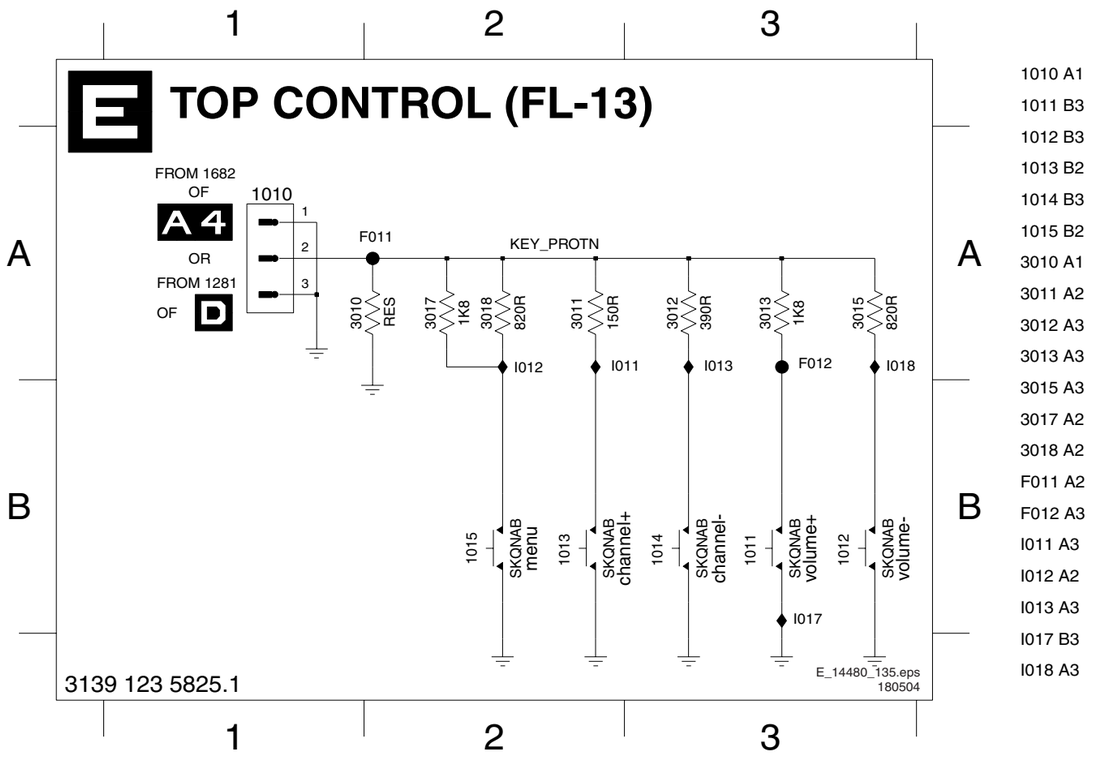
Layout Top Control Panel (PV2) (Top Side)



Layout Top Control Panel (PV2) (Bottom Side)

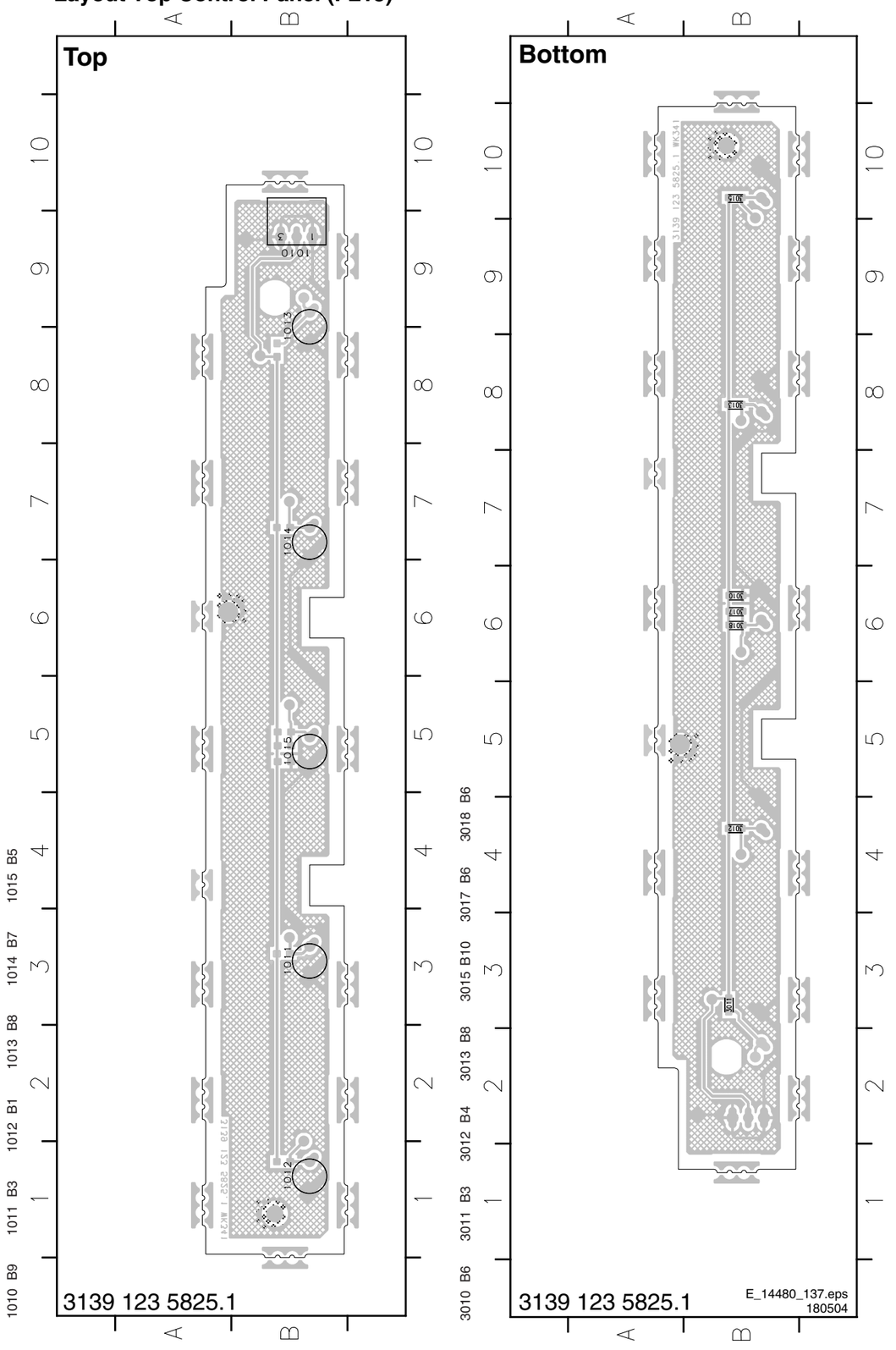


Top Control Panel (FL13)



1010 A1
1011 B3
1012 B3
1013 B2
1014 B3
1015 B2
3010 A1
3011 A2
3012 A3
3013 A3
3015 A3
3017 A2
3018 A2
F011 A2
F012 A3
I011 A3
I012 A2
I013 A3
I017 B3
I018 A3

Layout Top Control Panel (FL13)



1010 B9
1011 B3
1012 B1
1013 B8
1014 B7
1015 B5
3010 B6
3011 B3
3012 B4
3013 B8
3015 B10
3017 B6
3018 B6

Power Supply PIP Panel

F1 POWER SUPPLY PIP

ITEM	PIP-EU	PIP-RD+DVD-EU	PIP-AP	PIP+DVD-AP
1206	---	CON BM V 4P M 2.50	---	CON BM V 4P M 2.50
1220	---	CON BM V 5P M 2.5	---	CON BM V 5P M 2.5
2007	---	CER2 0603 X7R 16V 100N	---	CER2 0603 X7R 16V 100N
2242	---	CER2 0603 X7R 10V 220N	---	CER2 0603 X7R 10V 220N
2262	---	CER2 0603 X7R 16V 100N	---	CER2 0603 X7R 16V 100N
2263	---	CER2 0603 X7R 10V 2U2	---	CER2 0603 X7R 10V 2U2
2280	---	CER2 0603 X7R 16V 100N	---	CER2 0603 X7R 16V 100N
3010	---	RST SM 0603 75R PM5	---	RST SM 0603 75R PM5
3252	---	---	---	---
3253	---	RST SM 0603 75R PM5	---	RST SM 0603 75R PM5
3254	---	RST SM 0603 75R PM5	---	RST SM 0603 75R PM5
3255	---	RST SM 0603 2K2 PM5	---	RST SM 0603 2K2 PM5
3282	---	RST CRB 1/6W A 2K2 PM5	---	RST CRB 1/6W A 2K2 PM5
3283	---	RST SM 0603 15K PM5	---	RST SM 0603 15K PM5
3284	---	RST SM 0603 5K6 PM5	---	RST SM 0603 5K6 PM5
3285	---	RST SM 0603 75R PM5	---	RST SM 0603 75R PM5
3286	---	RST SM 0603 390R PM5	---	RST SM 0603 390R PM5
5245	---	RST SM 0603 75R PM5	---	RST SM 0603 75R PM5
7243	---	FXDIND SM 0805 5U6 PM10	---	FXDIND SM 0805 5U6 PM10

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221205

Tuner IF and Demodulator PIP Panel

F2 TUNER IF & DEMODULATOR PIP

F2

TUNER / IF

DEMODULATOR

ITEM	PIP-EU	PIP-RD+DVD-EU	PIP-AP	PIP+DVD-AP
1000	TUNER UV1316E/A I-4	TUNER UV1316T/A I X-3	TUNER UV1316T/A I-4	TUNER UV1316T/A I-4
1003	FIL SAW 38MHZ9 OFWK3953	FIL SAW 38MHZ9 OFWK3953	FIL SAW 38MHZ9 OFWK7257	FIL SAW 38MHZ9 OFWK7257
2005	---	---	CER2 0603 X7R 50V 10N	CER2 0603 X7R 50V 10N
3004	RST SM 0603 10K PM5	RST SM 0603 10K PM5	---	---
3007	---	---	RST SM 0603 6K8 PM5	RST SM 0603 6K8 PM5
3008	---	---	RST SM 0603 2K2 PM5	RST SM 0603 2K2 PM5
3009	---	---	RST SM 0603 2K2 PM5	RST SM 0603 2K2 PM5
3203	---	---	RST CRB 1/6W A 4K7 PM5	RST CRB 1/6W A 4K7 PM5
4001	---	---	RST SM 0603 JUMP 0R05	RST SM 0603 JUMP 0R05
4002	RST SM 0603 JUMP OR05	RST SM 0603 JUMP 0R05	---	---
4004	---	---	RST SM 0603 JUMP 0R05	RST SM 0603 JUMP 0R05
6001	DIO SIG SM 1SS356 (RH)	DIO SIG SM 1SS356 (RH)	---	---
6002	---	---	DIO SIG SM 1SS356 (RH)	DIO SIG SM 1SS356 (RH)
7001	---	---	TRA SIG SM PDTC124ET (C)	TRA SIG SM PDTC124ET (C)

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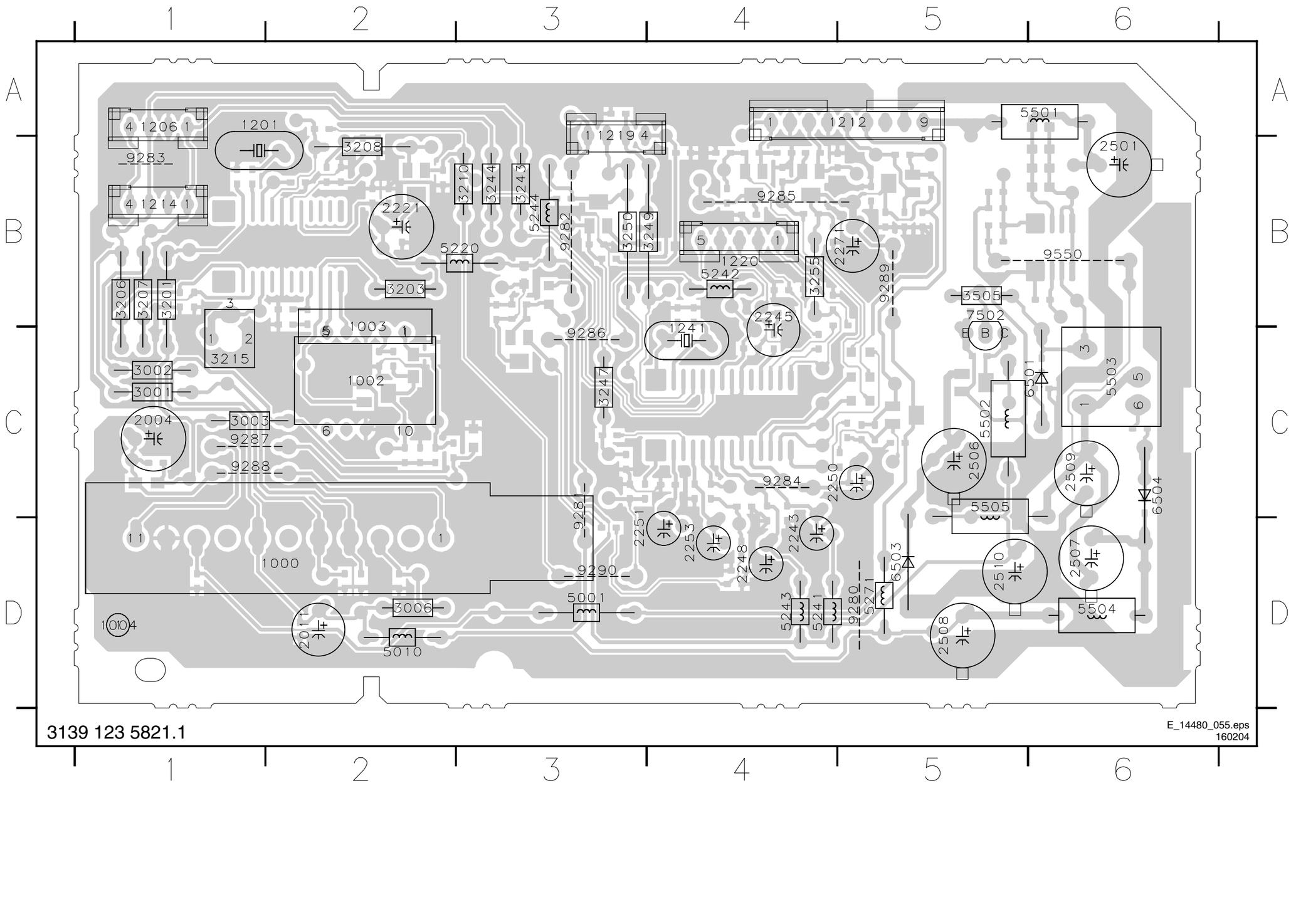
221205

Layout PIP Panel (Top Side)

1000	D2	1206	A1	1241	C4	2245	B4	2271	B5	2509	C6	3006	D2	3208	B2	3247	C3	5001	D3	5243	D4	5503	C6	6504	C6	9283	B1	9288	C1
1002	C2	1212	A5	2004	C1	2248	D4	2501	B6	2510	D5	3201	B1	3210	B3	3249	B4	5010	D2	5244	B3	5504	D6	7502	B5	9284	C4	9289	B5
1003	C2	1214	B1	2011	D2	2250	C4	2506	C5	3001	C1	3203	B2	3215	C1	3250	B3	5220	B3	5271	D5	5505	C5	9280	D5	9285	B4	9290	D3
1004	D1	1219	A3	2221	B2	2251	D3	2507	D6	3002	C1	3206	B1	3243	B3	3255	B4	5241	D4	5501	A6	6501	C6	9281	C3	9286	C3	9550	B6
1201	A1	1220	B4	2243	D4	2253	D4	2508	D5	3003	C1	3207	B1	3244	B3	3505	B5	5242	B4	5502	C5	6503	D5	9282	B3	9287	C1		



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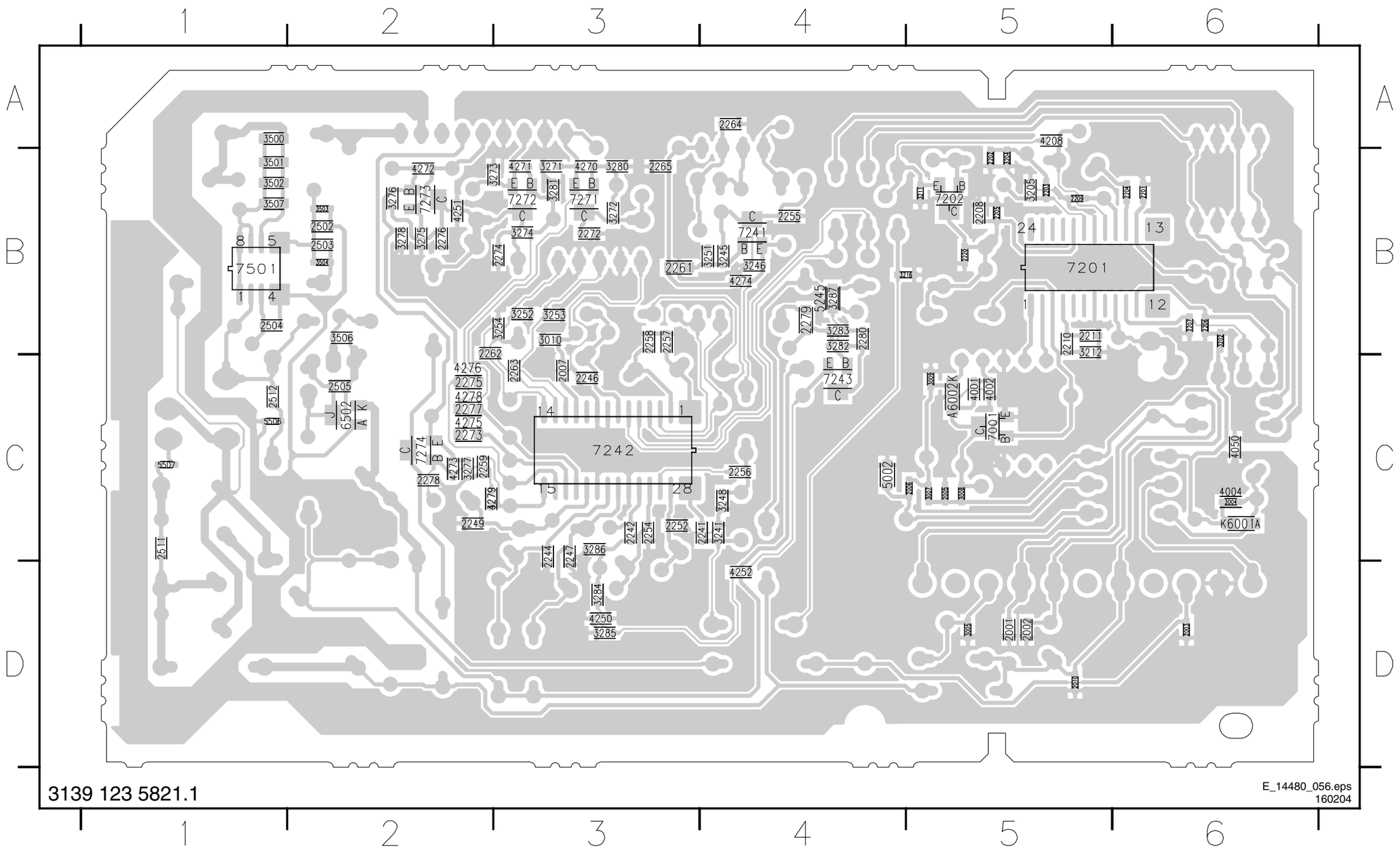
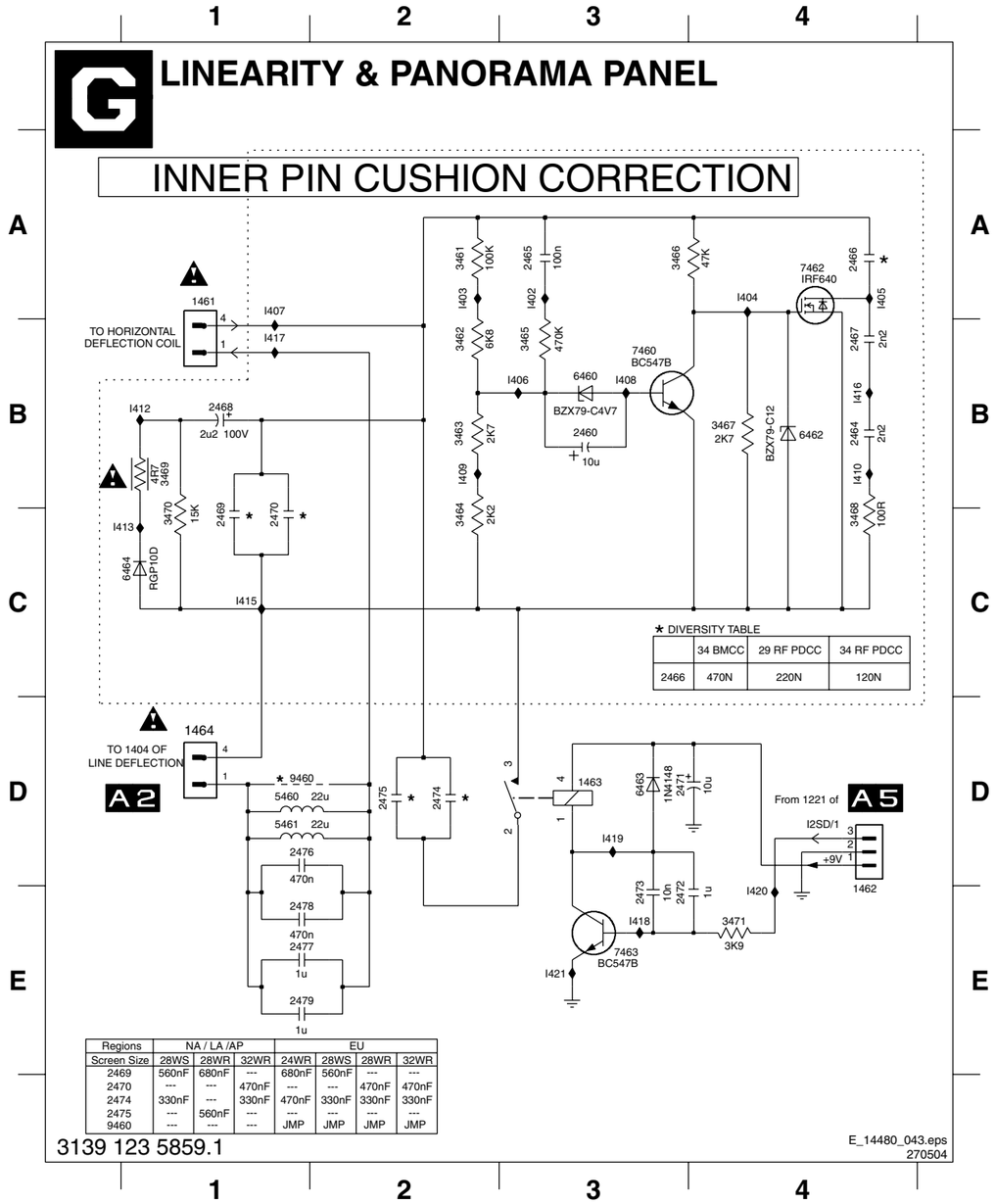
160204

Layout PIP Panel (Bottom Side)

2001	D5	2201	B6	2208	B5	2244	C3	2256	C4	2264	A4	2277	C2	2505	C2	3009	C5	3216	B4	3253	B3	3276	B2	3283	B4	3502	B1	4004	C6	4271	B3	4279	C2	6502	C2	7271	B3
2002	D5	2202	B5	2209	B5	2246	C3	2257	B3	2265	B3	2278	C2	2511	C1	3010	B3	3241	C4	3254	B3	3277	C2	3284	D3	3503	B2	4050	C6	4272	B2	5002	C4	7001	C5	7272	B3
2003	D6	2203	B5	2210	B5	2247	C3	2258	B3	2272	B3	2279	B4	2512	C1	3202	B6	3245	B4	3271	B3	3278	B2	3285	D3	3504	B2	4208	A5	4273	C2	5245	B4	7201	B5	7273	B2
2005	C5	2204	B6	2211	B5	2249	C2	2259	C2	2273	C2	2280	B4	3004	C6	3204	B5	3246	B4	3272	B3	3279	C2	3286	C3	3506	B2	4250	D3	4274	B4	5506	C1	7202	B5	7274	C2
2006	C5	2205	B5	2220	B5	2252	C3	2261	B3	2274	B3	2502	B2	3005	D5	3205	B5	3248	C4	3273	B2	3280	B3	3287	B4	3507	B1	4251	B2	4275	C2	6001	C6	7241	B4	7501	B1
2007	C3	2206	B6	2241	C4	2254	C3	2262	B2	2275	C2	2503	B2	3007	C5	3211	B5	3251	B4	3274	B3	3281	B3	3500	A1	4001	C5	4252	D4	4276	C2	6001	C6	7242	C3		
2010	D5	2207	B6	2242	C3	2255	B4	2263	C3	2276	B2	2504	B1	3008	C5	3212	B5	3252	B3	3275	B2	3282	B4	3501	B1	4002	C5	4270	B3	4278	C2	6002	C5	7243	C4		



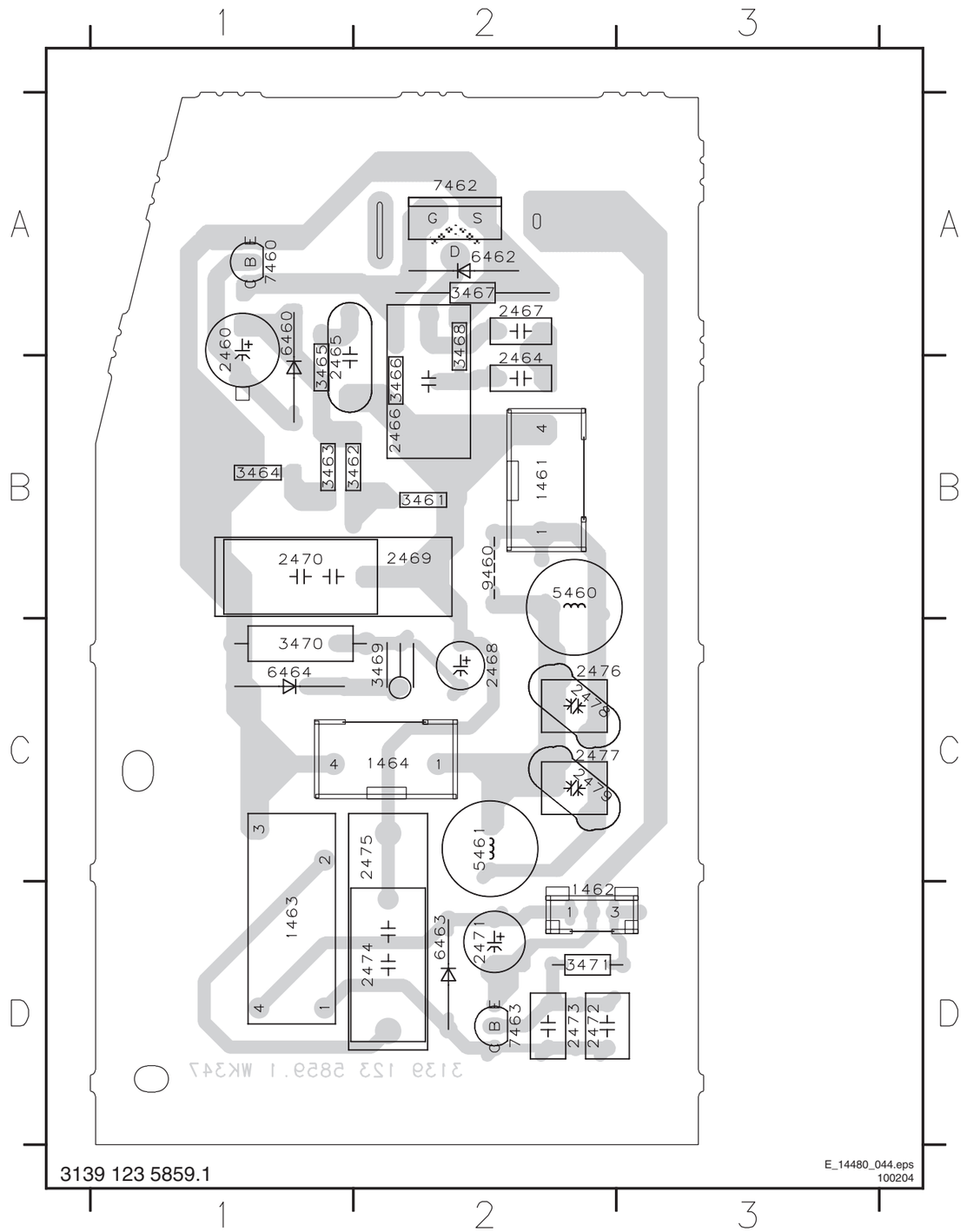
Linearity & Panorama Panel



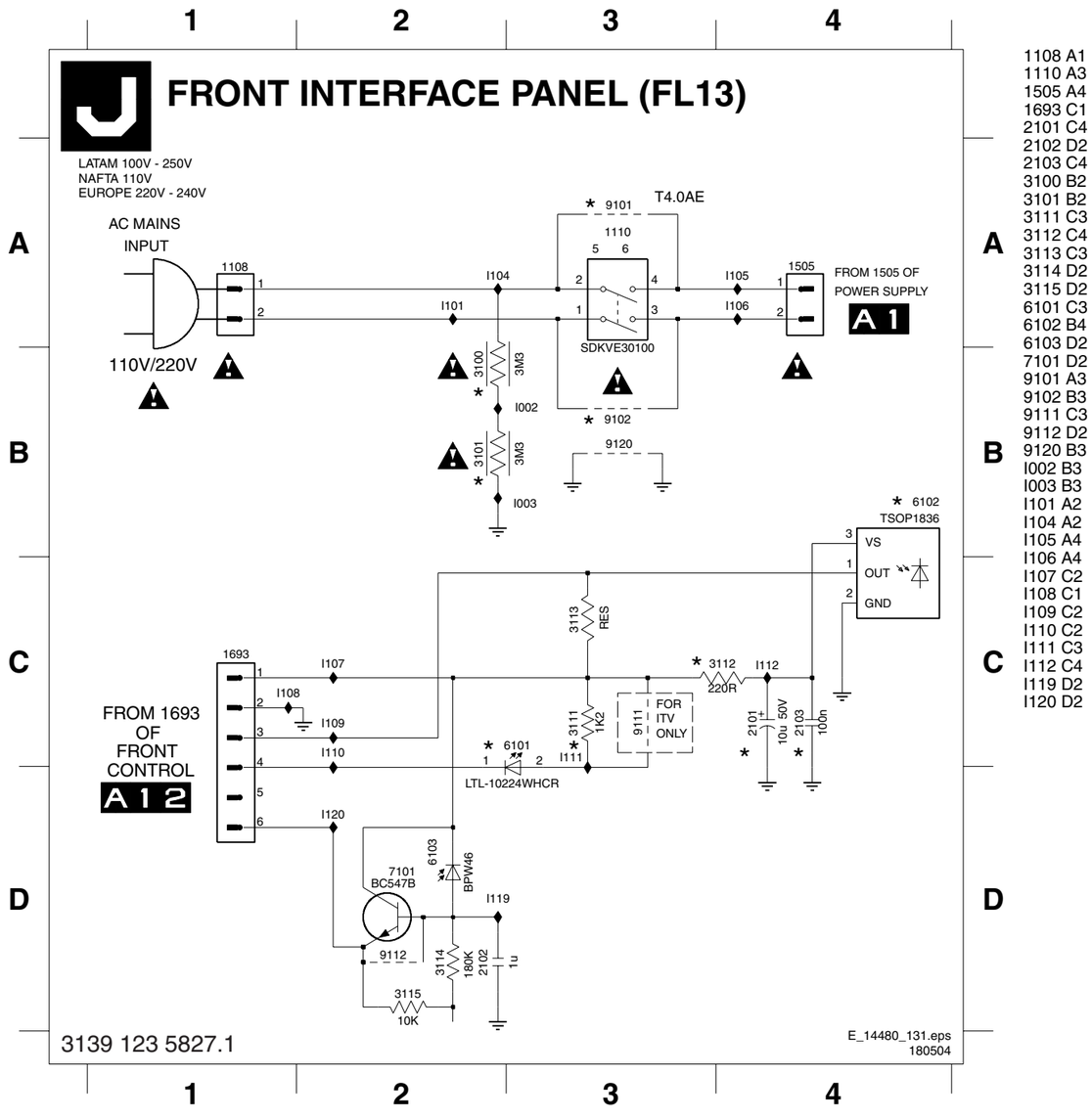
1461 A1
1462 D4
1463 D3
1464 D1
2460 B3
2464 B4
2465 A3
2466 A4
2467 B4
2468 B1
2469 C1
2470 C1
2471 D3
2472 E3
2473 E3
2474 D2
2475 D2
2476 D1
2477 E1
2478 E1
2479 E1
3461 A2
3462 B2
3463 B2
3464 C2
3465 B3
3466 A3
3467 B4
3468 C4
3469 B1
3470 C1
3471 E4
5460 D1
5461 D1
6460 B3
6462 B4
6463 D3
6464 C1
7460 B3
7462 A4
7463 E3
9460 D1
I402 A3
I403 A2
I404 A4
I405 A4
I406 B3
I407 A1
I408 B3
I409 B2
I410 B4
I412 B1
I413 C1
I415 C1
I416 B4
I417 B1
I418 E3
I419 D3
I420 E4
I421 E3

Layout Linearity & Panorama Panel (Top Side)

1461 B2 2464 B2 2469 B2 2474 D2 2479 C2 3465 B1 3470 C1 6461 A2 7462 D2
1462 D2 2465 B1 2470 B1 2475 C2 3461 B2 3466 B2 3471 D2 6462 D2 9460 B2
1463 D1 2466 B2 2471 D2 2476 C2 3462 B1 3467 A2 5460 B2 6463 C1
1464 C2 2467 A2 2472 D2 2477 C2 3463 B1 3468 A2 5461 C2 7460 A1
2460 A1 2468 C2 2473 D2 2478 C2 3464 B1 3469 C2 6460 A1 7461 A2

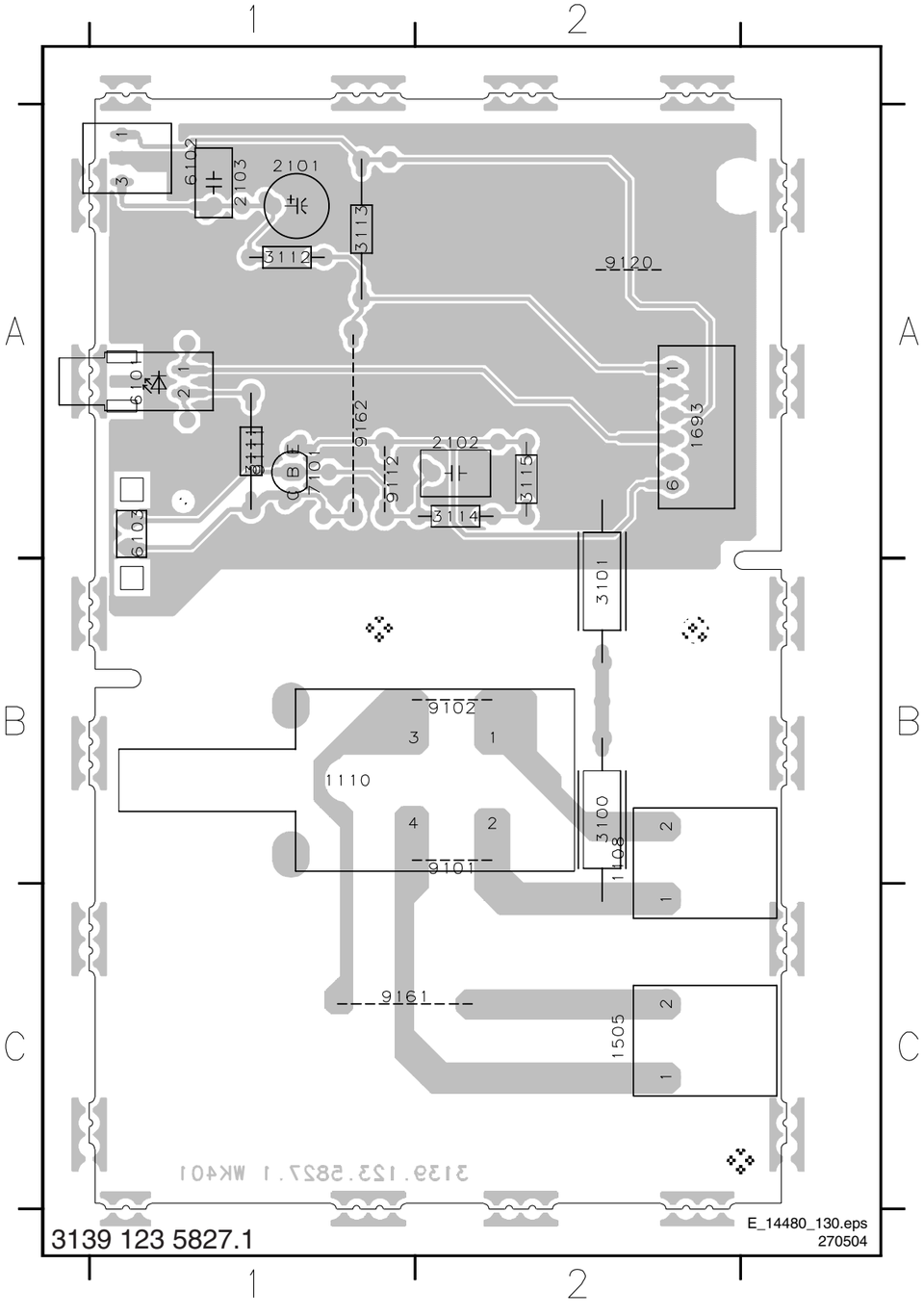


Front Interface Panel (FL13)



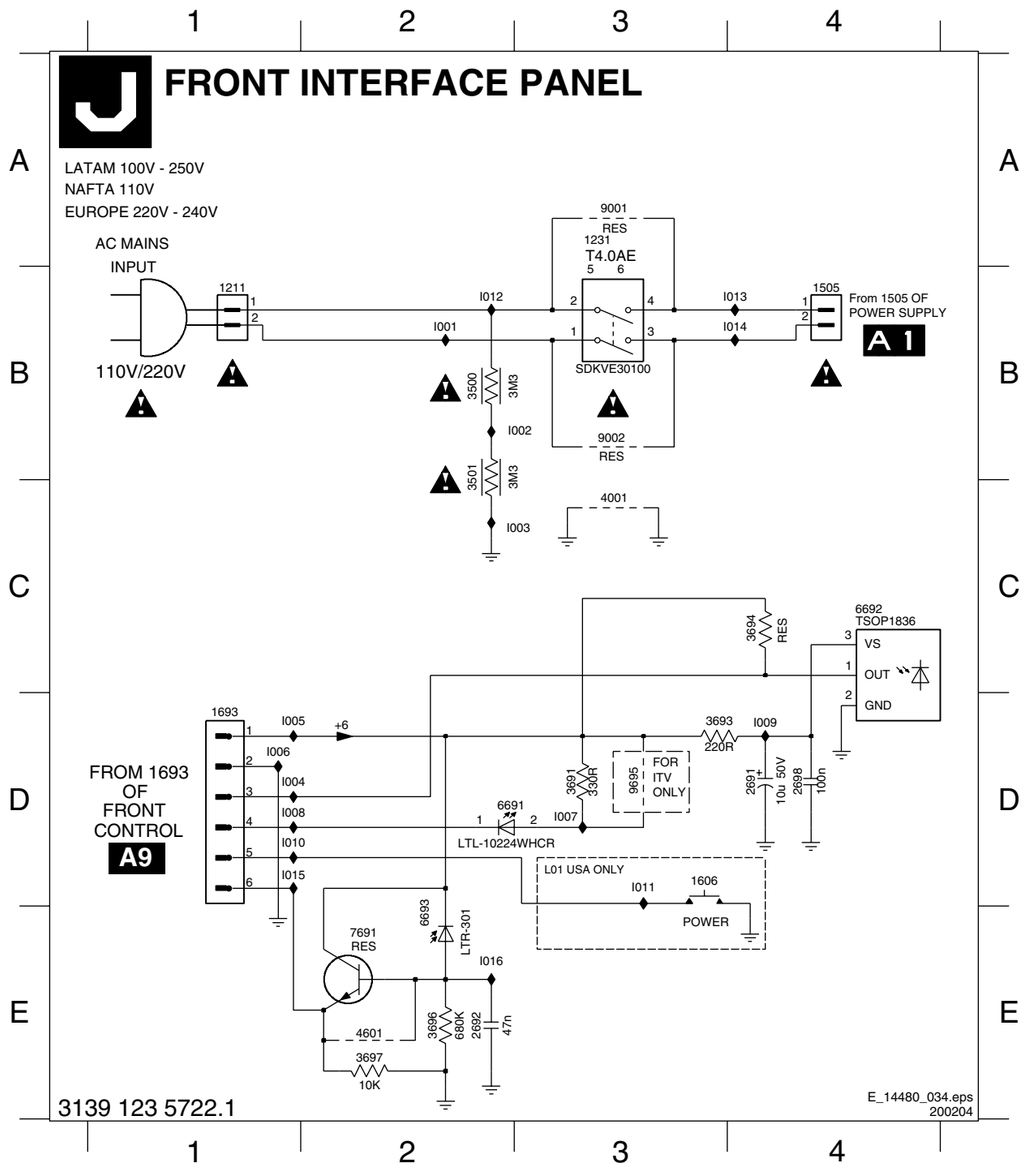
1108 A1
1110 A3
1505 A4
1693 C1
2101 C4
2102 D2
2103 C4
3100 B2
3101 B2
3111 C3
3112 C4
3113 C3
3114 D2
3115 D2
6101 C3
6102 B4
6103 D2
7101 D2
9101 A3
9102 B3
9111 C3
9112 D2
9120 B3
I002 B3
I003 B3
I101 A2
I104 A2
I105 A4
I106 A4
I107 C2
I108 C1
I109 C2
I110 C2
I111 C3
I112 C4
I119 D2
I120 D2

Layout Front Interface Panel (FL13) (Top Side)



1108 B2
1110 B1
1505 C2
1693 A2
2101 A1
2102 A2
2103 A1
3100 B2
3101 B2
3111 A1
3112 A1
3113 A1
3114 A2
3115 A2
6101 A1
6102 A1
6103 A1
7101 A1
9101 B2
9102 B2
9111 A1
9112 A1
9120 A2
9161 C1
9162 A1

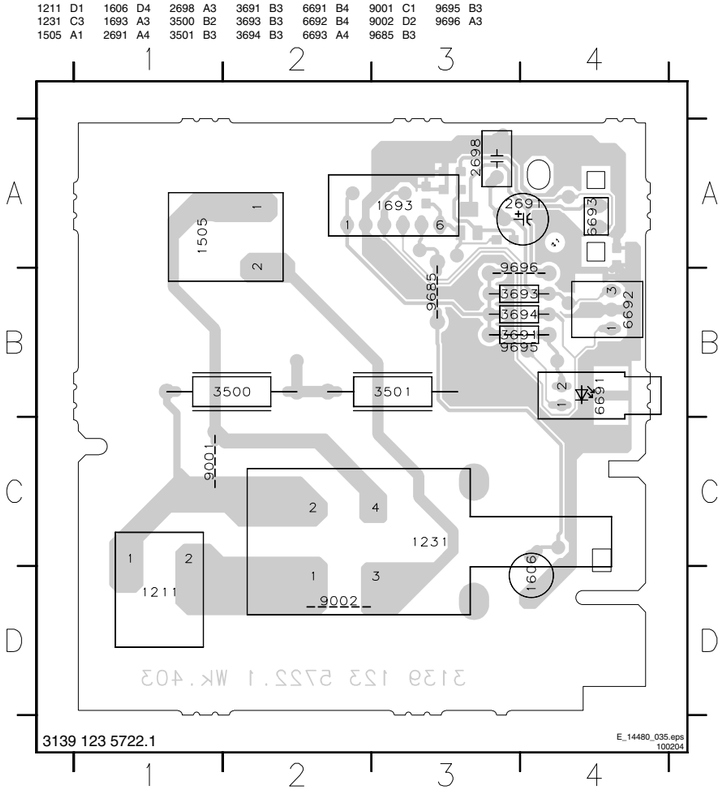
Front Interface Panel (PV2)



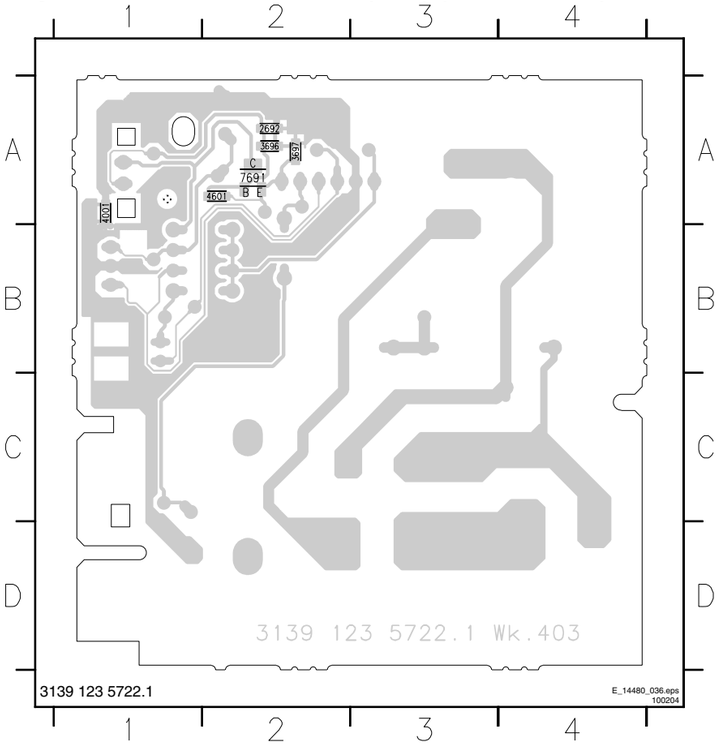
1211 B1
1231 A3
1505 B4
1606 D3
1693 D1
2691 D4
2692 E2
2698 D4
3500 B2
3501 B2
3691 D3
3693 D3
3694 C4
3696 E2
3697 E2
4001 C3
4601 E2
6691 D3
6692 C4
6693 E2
7691 E2
9001 A3
9002 B3
9695 D3
I001 B2
I002 B3
I003 C3
I004 D1
I005 D1
I006 D1
I007 D3
I008 D1
I009 D4
I010 D1
I011 D3
I012 B2
I013 B4
I014 B4
I015 D1
I016 E2

Layout Front Interface Panel (PV2) (Top Side)

1211 D1 1606 D4 2698 A3 3691 B3 6691 B4 9001 C1 9695 B3
1231 C3 1693 A3 3500 B2 3693 B3 6692 B4 9002 D2 9696 A3
1505 A1 2691 A4 3501 B3 3694 B3 6693 A4 9685 B3

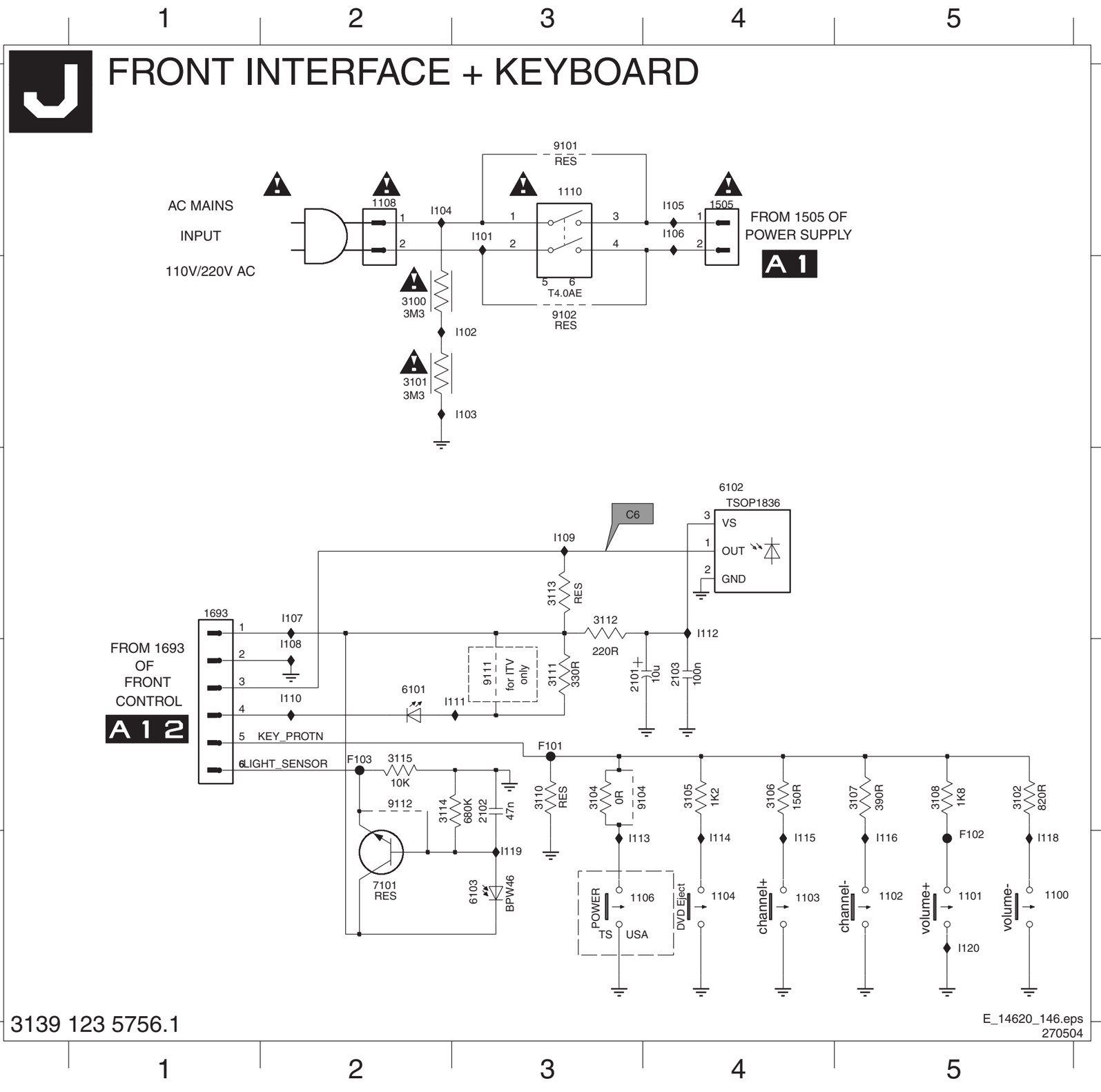


Layout Front Interface Panel (PV2) (Bottom Side)



Front Interface and Keyboard Panel

FRONT INTERFACE + KEYBOARD



1100 E5
1101 E5
1102 E5
1103 E4
1104 E4
1106 E3
1108 A2
1110 A3
1505 A4
1693 C1
2101 D3
2102 D3
2103 D4
3100 B2
3101 B2
3102 D5
3104 D3
3105 D4
3106 D4
3107 D5
3108 D5
3110 D3
3111 D3
3112 C3
3113 C3
3114 D2
3115 D2
6101 D2
6102 C4
6103 E3
7101 E2
9101 A3
9102 B3
9104 D4
9111 D3
9112 D2
F101 D3
F102 D5
F103 D2
I101 A3
I102 B3
I103 B3
I104 A2
I105 A4
I106 A4
I107 C2
I108 D2
I109 C3
I110 D2
I111 D3
I112 C4
I113 E3
I114 E4
I115 E4
I116 E5
I118 E5
I119 E3
I120 E5

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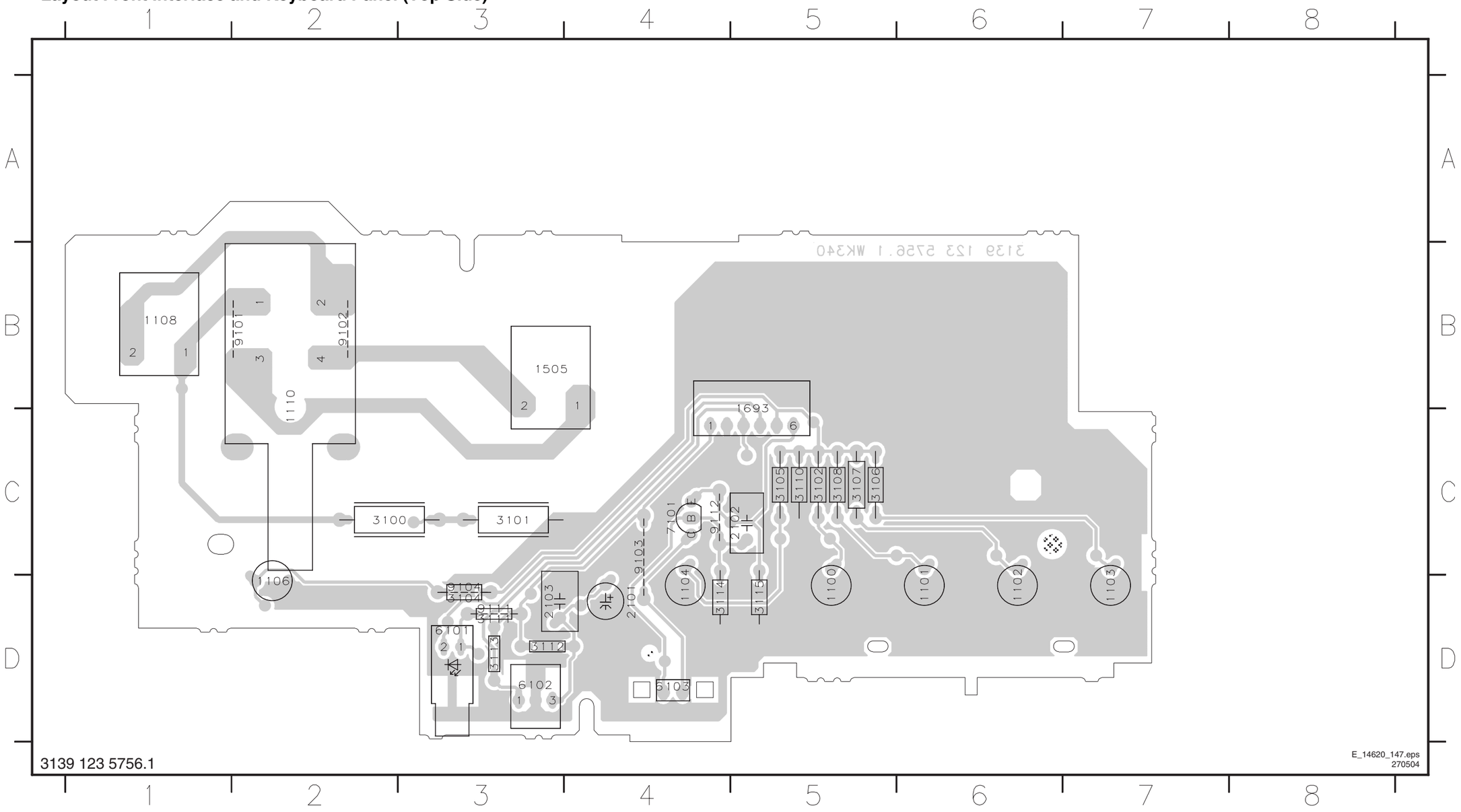
Layout Front Interface and Keyboard Panel (Top Side)



1100 D5
1101 D6
1102 D6
1103 D7
1104 D4
1106 D2
1108 B1
1110 B2
1505 B3
1693 B5
2101 D4
2102 C5
2103 D3
3100 C2
3101 C3
3102 C5
3104 D3
3105 C5
3106 C5
3107 C5
3108 C5
3110 C5
3111 D3
3112 D3
3113 D3
3114 D4
3115 D5
6101 D3
6102 D3
6103 D4
7101 C4
9101 B2
9102 B2
9103 C4
9104 D3
9111 D3
9112 C4

Personal Notes:

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131004

8. Alignments

Index of this chapter:

Note:

- The Service Default Mode (SDM) and Service Alignment Mode (SAM) are described in chapter 5 “Service Modes, ...”.
- Menu navigation is done with the CURSOR UP, DOWN, LEFT, or RIGHT keys of the remote control transmitter.

8.1 General Alignment Conditions

Perform all electrical adjustments under the following conditions:

- AC voltage and frequency: 120 V_ac / 60 Hz or 240 V_ac / 50 Hz (region dependent).
- Connect the set to the Mains voltage via an isolation transformer with a low internal resistance.
- Allow the set to warm up for approximately 20 minutes.
- Measure the voltages and waveforms in relation to chassis ground (with the exception of the voltages on the primary side of the power supply). Never use the cooling fins / plates as ground.
- Test probe: Ri > 10 Mohm; Ci < 2.5 pF.
- Use an isolated trimmer / screwdriver to perform the alignments.

8.2 Hardware Alignments

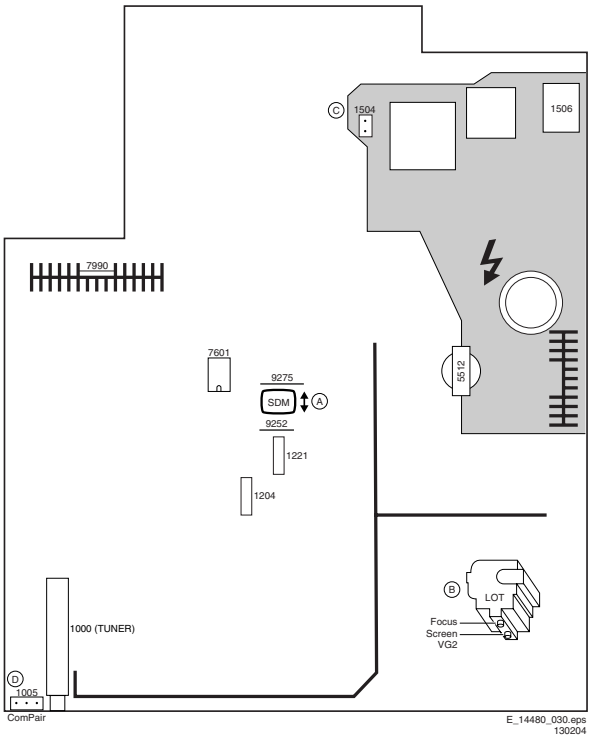


Figure 8-1 Top view family board

8.2.1 Vg2 Adjustment

1. Activate the SAM.
2. Go to the WHITE TONE sub menu.
3. Set the values of NORMAL RED, GREEN and BLUE to “32”.
4. Go, via the MENU key, to the normal user menu and set
5. SATURATION/COLOR to “0”.
6. CONTRAST to “0”.
7. BRIGHTNESS to minimum (OSD just visible).
8. Return to the SAM via the MENU key.
9. Connect the RF output of a pattern generator to the antenna input. Test pattern is a 'black' picture (blank screen on CRT without any OSD info) with a signal strength of 1 V_pp.
10. Set the channel of the oscilloscope to 50 V/div and the time base to 0.2 ms (external triggering on the vertical pulse). Ground the scope at the CRT panel and connect a 10:1 probe to one of the cathodes of the picture tube socket (see diagram B).
11. Measure the cut off pulse during first full line after the frame blanking (see figure “V_cutoff waveform”). You will see two pulses, one being the “cut off” pulse and the other being the “white drive” pulse. Choose the one with the lowest value; this is the “cut off” pulse.
12. Select the cathode with the highest V_dc value for the alignment. Adjust the V_cutoff of this gun with the SCREEN potentiometer (see figure “Top view family board”) on the LOT to 160 V_dc, except for the 25/28BLD picture tube (Black Line Display, for EU only); this tube must be aligned to 140 V_dc.
13. Restore BRIGHTNESS and CONTRAST to normal (= 31).

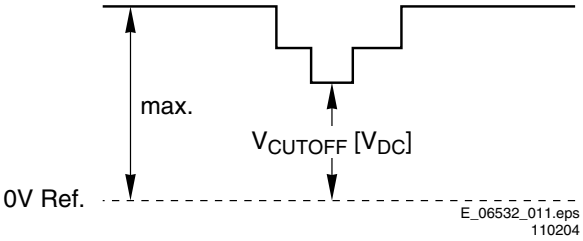


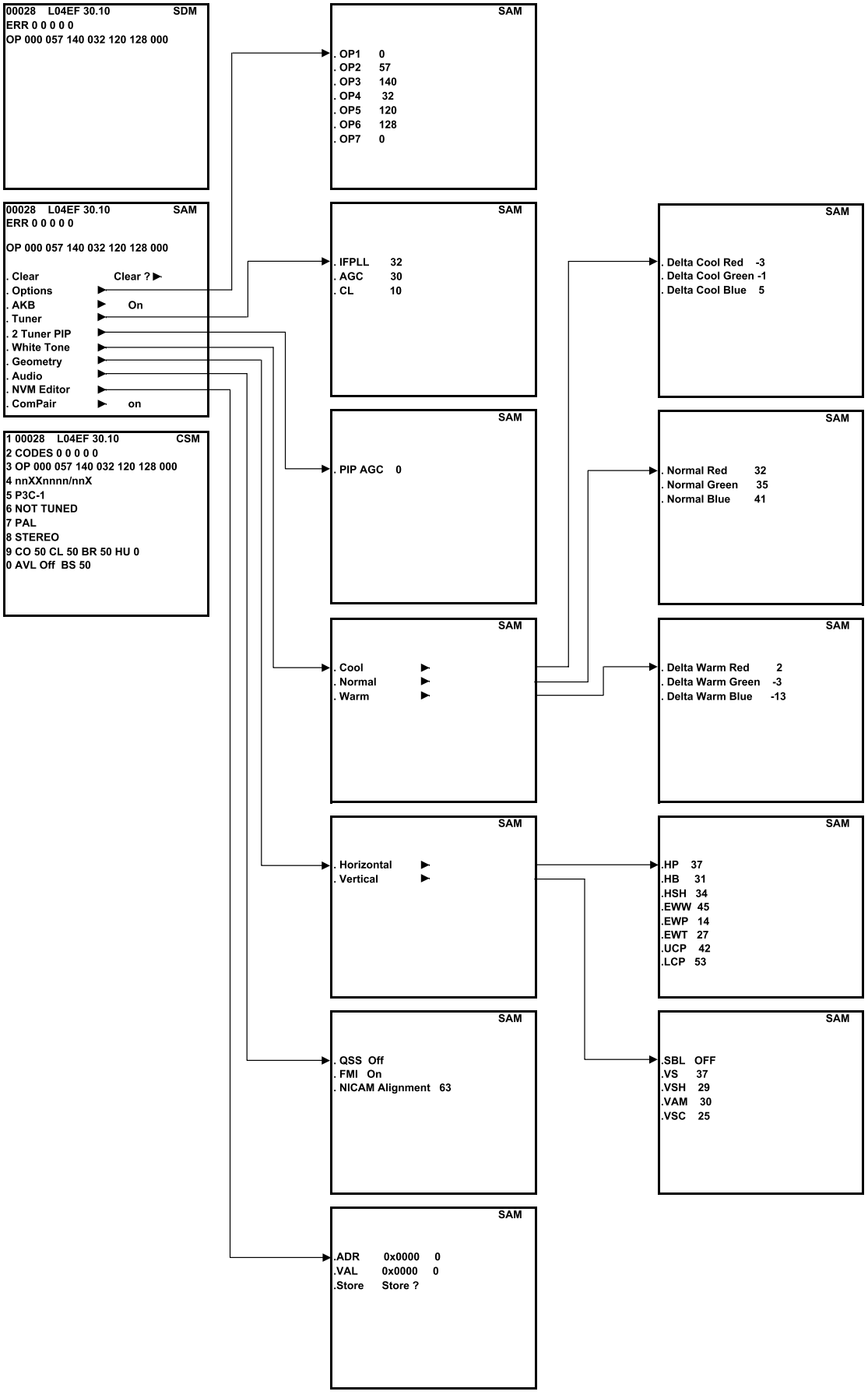
Figure 8-2 V_cutoff waveform

8.2.2 Focusing

1. Tune the set to a circle or crosshatch test pattern (use an external video pattern generator).
2. Choose picture mode NATURAL (or MOVIES) with the SMART PICTURE button on the remote control transmitter.
3. Adjust the FOCUS potentiometer (see figure “Top view family board”) until the vertical lines at 2/3 from east and west, at the height of the centre line, are of minimum width without visible haze.

8.3 Software Alignments and Settings

Note: The values are indicative.



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260504

Figure 8-3 Service Mode overview

Enter the Service Alignment Mode (see also chapter 5 “Service Modes, ...”). The SAM menu will now appear on the screen. Select one of the following alignments:

- Options
- Tuner
- White Tone
- Geometry
- Audio

8.3.1 Options

Options are used to control the presence/absence of certain features and hardware.

How to Change an Option Byte

An Option Byte represents a number of different options. Changing these bytes directly, makes it possible to set all options very fast. All options are controlled via seven option bytes. Select the option byte (OP1.. OP7) with the MENU UP/ DOWN keys, and enter the new value.

Leaving the OPTION submenu saves the changes in the Option Byte settings. Some changes will only take effect after the set has been switched “OFF” and “ON” with the AC power switch (cold start).

How to Calculate the Value of an Option Byte

- Calculate an Option Byte value (OP1 .. OP7) in the following way:
- Check the status of the single option bits (OB): are they enabled (1) or disabled (0).
- When an option bit is enabled (1) it represents a certain value (see column “Bit value” in table below). When an option bit is disabled, its value is 0.
- The total value of an Option Byte (decimal) is formed by the sum of its eight option bits. The factory values are printed on a sticker on the CRT.

Table 8-1 Option Byte calculation

Bit (value)	OP1	OP2	OP3	OP4	OP5	OP6	OP7
0 (1)	OB10	OB20	OB30	OB40	OB50	OB60	OB70
1 (2)	OB11	OB21	OB31	OB41	OB51	OB61	OB71
2 (4)	OB12	OB22	OB32	OB42	OB52	OB62	OB72
3 (8)	OB13	OB23	OB33	OB43	OB53	OB63	OB73
4 (16)	OB14	OB24	OB34	OB44	OB54	OB64	OB74
5 (32)	OB15	OB25	OB35	OB45	OB55	OB65	OB75
6 (64)	OB16	OB26	OB36	OB46	OB56	OB66	OB76
7 (128)	OB17	OB27	OB37	OB47	OB57	OB67	OB77
Total:	Sum	Sum	Sum	Sum	Sum	Sum	Sum

Option Bit Assignment

Following are the option bit assignments for all software clusters.

Table 8-2 Option code overview

	Model number	29PT5408/01 29PT5408/58 29PT5458/01 29PT5458/58
Bit	Byte_1	
7	Philips Tuner	1
6	FM Radio	0
5	LNA	0
4	ATS(EU)	1
3	ACI	1
2	UK PNP	0
1	Virgin Mode	0
0	China	0
	Decimal	152
	Hex	98
Bit	Byte_2	
7	SC	0
6	Green_UI	0
5	Channel Naming	0
4	LTI	0
3	Tilt	0
2	Fine Tuning	1
1	PIP Philips Tuner	0
0	Hue	0
	Decimal	4
	Hex	04
Bit	Byte_3	
7	EW Function	1
6	2 Tuner PIP	0
5	PIP_SPLITTER/WAKEUP_CLOCK	1
4	SPLITTER/SMART_CLOCK	1
3	Virtual Dolby	0
2	Wide Screen	0
1	WSSB(EU)	0
0	Eco_Subwoofer	0
	Decimal	176
	Hex	B0
Bit	Byte_4	
7	Compress_16_9	1
6	OPTIMIZED_START	0
5	Ultra Bass	1
4	Delta Volume	0
3		0
2	Volume Limiter	0
1		0
0	Stereo_Nicam_2CS	1
	Decimal	161
	Hex	A1
Bit	Byte_5	
7	AV1	1
6	AV2	1
5	AV3	1
4	CVI	0
3	SVHS2	1
2	SVHS3	0
1	Hotel Mode	0
0	Simply Factory	0
	Decimal	232
	Hex	E8
Bit	Byte_6	
7	Personal Zapping	0
6	Smart_Surf	0
5	FM Trap	0
4	Combfilter	0
3	Active Control	0
2	Video Text	0
1	Light Sensor	0
0	Dual Text	0
	Decimal	0
	Hex	00
Bit	Byte_7	
7	Time Win1	0
6	Malay	0
5	Thai	0
4		0
3		0
2		0
1		0
0		0
	Decimal	0
	Hex	00
Bit	Byte_8	
7	-	0
6	-	0
5	-	0
4	-	0
3	-	0
2	-	0
1	-	0
0	-	0
	Decimal	0
	Hex	00

- Option Byte 1 (OP1)
  - OB17: PHILIPS TUNER
  - OB16: FM RADIO
  - OB15: LNA
  - OB14: ATS (EU)
  - OB13: ACI
  - OB12: UK PNP
  - OB11: VIRGIN MODE
  - OB10: CHINA
- Option Byte 2 (OP2)
  - OB27: SC
  - OB26: GREEN UI
  - OB25: CHANNEL NAMING
  - OB24: LTI
  - OB23: TILT
  - OB22: FINE TUNING
  - OB21: PIP PHILIPS TUNER
  - OB20: HUE
- Option Byte 3 (OP3)
  - OB37: EW FUNCTION
  - OB36: 2 TUNER PIP
  - OB35: PIP SPLITTER/WAKEUP CLOCK
  - OB34: SPLITTER/SMART CLOCK
  - OB33: VIRTUAL DOLBY
  - OB32: WIDE SCREEN
  - OB31: WSSB (EU)
  - OB30: ECO SUBWOOFER
- Option Byte 4 (OP4)
  - OB47: COMPRESS 16:9
  - OB46: OPTIMIZED START
  - OB45: ULTRA BASS
  - OB44: DELTA VOLUME
  - OB43: Reserved (value= 0)
  - OB42: VOLUME LIMITER
  - OB41: Reserved (value= 0)
  - OB40: STEREO NICAM 2CS
- Option Byte 5 (OP5)
  - OB57: AV1
  - OB56: AV2
  - OB55: AV3
  - OB54: CVI
  - OB53: SVHS2
  - OB52: SVHS3
  - OB51: HOTEL MODE
  - OB50: Reserved (value= 0)
- Option Byte 6 (OP6)
  - OB67: PERSONAL ZAPPING
  - OB66: Reserved (value= 0)
  - OB65: FM TRAP
  - OB64: COMB FILTER
  - OB63: ACTIVE CONTROL
  - OB62: VIDEO TEXT
  - OB61: LIGHT SENSOR
  - OB60: DUAL TEXT
- Option Byte 7 (OP7)
  - OB77: TIME WIN1
  - OB76: Reserved (value= 0)
  - OB75: Reserved (value= 0)
  - OB74: Reserved (value= 0)
  - OB73: Reserved (value= 0)
  - OB72: Reserved (value= 0)
  - OB71: Reserved (value= 0)
  - OB70: Reserved (value= 0)

Option Bit Definition

Option Byte 1 (OP1)

- OB17: PHILIPS TUNER
  - 0: ALPS / MASCO compatible tuner is in use.
  - 1: Philips compatible tuner is in use.
- OB16: FM RADIO
  - 0: FM radio feature is disabled or not applicable.
  - 1: FM radio feature is enabled.
- OB15: LNA
  - 0: Auto Picture Booster is not available or not applicable.
  - 1: Auto Picture Booster is available.
- OB14: ATS
  - 0: Automatic Tuning System (ATS) feature is disabled or not applicable.
  - 1: ATS feature is enabled. When ATS is enabled, it sorts the program in an ascending order starting from program “1”.
- OB13: ACI
  - 0: Automatic Channel Installation (ACI) feature is disabled or not applicable.
  - 1: ACI feature is enabled.
- OB12: UK PNP
  - 0: UK's default Plug and Play setting is not available or not applicable.
  - 1: UK's default Plug and Play setting is available.
  - When UK PNP and VIRGIN MODE are set to “1” at the initial setup and after exiting from menu, VIRGIN MODE will be set automatically to “0” while UK PNP remains “1”.
- OB11: VIRGIN MODE
  - 0: Virgin mode is disabled or not applicable.
  - 1: Virgin mode is enabled. Plug and Play menu item will be displayed to perform installation at the initial start-up of the TV when VIRGIN MODE is set to “1”. After installation is finished, this option bit will be automatically set to “0”.
- OB10: CHINA
  - 0: Tuning is not for China set, or this option bit is not applicable.
  - 1: Tuning is for China set.

Option Byte 2 (OP2)

- OB27: SC
  - 0: Soft clipping is disabled.
  - 1: Soft clipping is enabled.
- OB26: GREEN UI
  - 0: Green UI is disabled (for Philips brand).
  - 1: Green UI is enabled (for Magnavox brand).
  - Note: only for NAFTA region.
- OB25: CHANNEL NAMING
  - 0: Name FM Channel is disabled or not applicable.
  - 1: Name FM Channel is enabled.
  - Note: Name FM channel can be enabled only when FM RADIO= “1”.
- OB24: LTI
  - 0: Luminance Transient Improvement (LTI) is disabled or not applicable.
  - 1: LTI is enabled.
- OB23: TILT
  - 0: Rotate Picture is disabled or not applicable.
  - 1: Rotate Picture is enabled.
- OB22: FINE TUNING
  - 0: Fine Tuning for Channel Offset is disabled or not applicable.
  - 1: Fine Tuning for Channel Offset is enabled.
- OB21: PIP PHILIPS TUNER
  - 0: ALPS / MASCO compatible tuner is in use for PIP module.
  - 1: Philips compatible tuner is in use for PIP module.
- OB20: HUE
  - 0: Hue/Tint Level is disabled or not applicable.
  - 1: Hue/Tint Level is enabled.

Option Byte 3 (OP3)

- OB37: EW FUNCTION
  - 0: EW function is disabled. In this case, only Expand 4:3 is allowed, Compress 16:9 is not applicable.
  - 1: EW function is enabled. In this case, both Expand 4:3 and Compress 16:9 are applicable.
- OB36: 2 TUNER PIP
  - 0: Software selection no PIP
  - 1: Software selection with PIP

  - Note: Only for EU/AP region for sets with PIP.
- OB35: PIP SPLITTER/WAKEUP CLOCK
  - 0: Normal Tuner in PIP/No wake-up clock
  - 1: Splitter in PIP OR Wake-up clock
  - Note: Only for EU/AP region. For PIP sets and build in with Splitter in PIP tuner.
- OB34: SPLITTER/SMART CLOCK
  - 0: Normal Tuner for main chassis/No smart clock
  - 1: Splitter Tuner for main chassis OR Smart clock
  - Note: Only for EU/AP region.
- OB33: VIRTUAL DOLBY
  - 0: Virtual Dolby is not applicable.
  - 1: Virtual Dolby is applicable.
- OB32: WIDE SCREEN
  - 0: Software is used for 4:3 sets or not applicable.
  - 1: Software is used for 16:9 sets.
- OB31: WSSB (EU)
  - 0: WSSB is disabled or not applicable.
  - 1: WSSB is enabled.
  - Note: This option bit can be set to “1” only when WIDE SCREEN= “1”.
- OB30: ECO SUBWOOFER
  - 0: Feature is disabled or not applicable.
  - 1: Feature is enabled.

Option Byte 4 (OP4)
- OB47: COMPRESS 16:9
  - Default setting is “0”.
- OB46: OPTIMIZED START
  - Default setting is “0”.
- OB45: ULTRA BASS
  - 0: Ultra Bass is disabled or not applicable.
  - 1: Ultra Bass is enabled.
  - Default setting is “0”.
- OB44: DELTA VOLUME
  - 0: Delta Volume Level is disabled or not applicable.
  - 1: Delta Volume Level is enabled.
- OB43: Reserved
  - Default setting is “0”.
- OB42: VOLUME LIMITER
  - 0: Volume Limiter Level is disabled or not applicable.
  - 1: Toggle Volume Limiter Level is enabled.
- OB41: Reserved
  - Default setting is “0”.
- OB40: STEREO NICAM 2CS
  - 0: For AV Stereo.
  - 1: For NICAM Stereo 2CS.

Option Byte 5 (OP5)
- OB57: AV1
  - 0: AV1 source is not present.
  - 1: AV1 source is present.
- OB56: AV2
  - 0: AV2 source is not present.
  - 1: AV2 source is present.
  - Note: For EU, when AV2=“1”, both EXT2 and SVHS2 should be included in the OSD loop.
- OB55: AV3
  - 0: Side/Front AV3 source is not present.
  - 1: Side/Front AV3 source is present.
- OB54: CVI
  - 0: CVI source is not available.
  - 1: CVI source is available.
- OB53: SVHS2
  - 0: SVHS2 source is not available.
  - 1: SVHS2 source is available.
  - Note: This option bit is not applicable for EU.
- OB52: SVHS3
  - 0: SVHS3 source is not available.
  - 1: SVHS3 source is available.
  - Note: This option bit is not applicable for EU.
- OB51: HOTEL MODE
  - 0: Hotel mode is disabled or not applicable.
  - 1: Hotel mode is enabled.
- OB50: Reserved
  - Default setting is “0”.

Option Byte 6 (OP6)
- OB67: PERSONAL ZAPPING
  - 0: Personal Zapping feature is disabled or not applicable.
  - 1: Personal Zapping feature is enabled.
- OB66: Reserved
  - Default setting is “0”.
- OB65: FM TRAP
  - 0: FM Trap is not present.
  - 1: FM Trap is present.
  - Note: Only for LATAM region.
- OB64: COMBFILTER
  - 0: 3D-combfilter is not present.
  - 1: 3D-combfilter is present.
- OB63: ACTIVE CONTROL
  - 0: Active Control feature is disabled or not applicable.
  - 1: Active Control feature is enabled.
- OB62: VIDEO TEXT
  - 0: Video Text (DW with TXT) is disabled or not applicable.
  - 1: Video Text (DW with TXT) is enabled.
  - Note: For EU only.
- OB61: LIGHT SENSOR
  - 0: Light sensor feature is disabled or not applicable.
  - 1: Light sensor feature is enabled.
- OB60: DUAL TEXT
  - 0: Dual Text and Text Dual Screen are disabled or not applicable.
  - 1: Dual Text and Text Dual Screen are enabled.

Option Byte 7 (OP7)
- OB77: TIME WIN1
  - 00: The time window is set to 1.2 s.
  - 01: The time window is set to 2 s.
  - Note: The time-out for all digit entries depends on this setting.
- OB76: Reserved
  - Default setting is “0”.
- OB75: Reserved
  - Default setting is “0”.
- OB74: Reserved
  - Default setting is “0”.
- OB73: Reserved
  - Default setting is “0”.
- OB72 Reserved
  - Default setting is “0”.
- OB71 Reserved
  - Default setting is “0”.
- OB70: Reserved
  - Default setting is “0”.

8.3.2 Tuner

Note: Described alignments are only necessary when the NVM (item 7601) is replaced.

IF PLL

This adjustment is auto-aligned. Therefore, no action is required.

AGC (AGC Take-over Point)

1. Set the external pattern generator to a colour bar video signal and connect the RF output to aerial input. Set amplitude to 10 mV and set frequency to 475 MHz.
2. Connect a DC multimeter to pin 1 of the tuner (item 1000 on the main panel).
3. Activate the SAM.
4. Go to the TUNER sub menu.
5. Select AGC with the UP/DOWN cursor keys.

6. Adjust the AGC-value with the LEFT/ RIGHT cursor keys until the voltage at pin 1 of the tuner lies between 3.8 and 2.3 V (default value is “20”).
7. Switch the set to STANDBY, in order to store the alignments.

CL (Cathode drive level)
Always set to “5”.

8.3.3 White Tone

In the WHITE TONE sub menu, the values of the black cut off level can be adjusted. Normally, no alignment is needed, and you can use the given default values.
The colour temperature mode (NORMAL, COOL and WARM) and the colour (R, G, and B) can be selected with the UP/ DOWN RIGHT/LEFT cursor keys. The value can be changed with the LEFT/RIGHT cursor keys. First, select the values for the NORMAL colour temperature. Then select the values for the COOL and WARM mode. After alignment, switch the set to STANDBY, in order to store the alignments.

Default settings:
- NORMAL:
  - NORMAL R= “26”
  - NORMAL G= “32”
  - NORMAL B= “27”
- COOL:
  - DELTA COOL R= “-3”
  - DELTA COOL G= “0”
  - DELTA COOL B= “5”
- WARM:
  - DELTA WARM R= “2”
  - DELTA WARM G= “0”
  - DELTA WARM B= “-6”

8.3.4 Geometry

The geometry alignments menu contains several items to align the set, in order to obtain correct picture geometry.

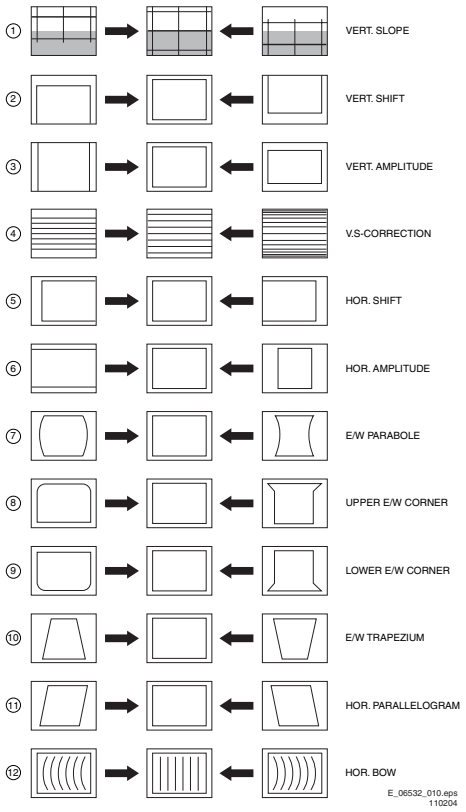


Figure 8-4 Geometry alignments

1. Connect an external video pattern generator to the aerial input of the TV-set and input a crosshatch test pattern. Set the generator amplitude to at least 1 mV and set frequency to 475 MHz.
2. Set 'Smart Picture' to NATURAL (or MOVIES).
3. Activate the SAM menu (see chapter 5 “Service Modes, ...”).
4. Go to the GEOMETRY sub menu.
5. Choose HORIZONTAL or VERTICAL alignment.

Now the following alignments can be performed:

Horizontal
- **Horizontal Parallelogram (HP).** Align straight vertical lines in the top and the bottom; vertical rotation around the centre.
- **Horizontal Bow (HB).** Align straight horizontal lines in the top and the bottom; horizontal rotation around the centre.
- **Horizontal Shift (HSH).** Align the horizontal centre of the picture to the horizontal centre of the CRT.
- **East West Width (EWW).** Align the picture width until the complete test pattern is visible.
- **East West Parabola (EWP).** Align straight vertical lines at the sides of the screen.
- **Upper Corner Parabola (UCP).** Align straight vertical lines in the upper corners of the screen.
- **Lower Corner Parabola (LCP).** Align straight vertical lines in the lower corners of the screen.
- **East West Trapezium (EWT).** Align straight vertical lines in the middle of the screen.
- **H60 (Delta HSH for 60Hz, if present).** Align straight horizontal lines if NTSC system is used (60 Hz) i.s.o. PAL (50 Hz). Default value is “9”.

Vertical
- **Service blanking (SBL).** Switch the blanking of the lower half of the screen “ON” or “OFF” (to be used in combination with the vertical slope alignment).
- **Vertical Shift (VSH).** Align the vertical centring so that the test pattern is located vertically in the middle. Repeat the 'vertical amplitude' alignment if necessary.
- **Vertical slope (VS).** Align the vertical centre of the picture to the vertical centre of the CRT. This is the first of the vertical alignments to perform. For an easy alignment, set SBL to “on”.
- **Vertical Amplitude (VAM).** Align the vertical amplitude so that the complete test pattern is visible.
- **Vertical S-Correction (VSC).** Align the vertical linearity, meaning that vertical intervals of a grid pattern must be equal over the entire screen height.
- **Vertical Zoom (VX, if present).** The vertical zoom is added in for the purpose of development. It helps the designer to set proper values for the movie expand or movie (16x9) compress. Default value is “25”.
- **V60 (Delta VAM for 60Hz, if present).** Align straight vertical lines if NTSC system (60 Hz) is used i.s.o. PAL (50 Hz). Default value is “-2”.

In the next table, you will find the GEOMETRY default values for the different sets.

Table 8-3 Default geometry values

Alignment	Default values (hex)	Default values (dec)
HP (Horizontal parallelogram)	1F	31
HB (Horizontal Bow)	1F	31
HS (Horizontal shift)	1A	26
EWW (EW width)	25	37
EWP (EW parabola width)	0A	10
EWT (EW trapezium)	1A	26
UCP (EW upper corner parabola)	1E	30
LCP (EW lower corner parabola)	28	40
VSH (Vertical Shift)	1A	26
VS (Vertical slope)	25	37
VAM (Vertical amplitude)	1E	30
VSC (Vertical S-Correction)	19	25

8.3.5 Audio

No alignments are needed for the audio sub menu. Use the given default values.

QSS (Quasi Split Sound)
- For NICAM/2CS sound system (EU/AP, except for APNTSC), set to “ON”.
- For AV-Stereo sound system (sets without NICAM), set to “ON”.
- For all other sets (NAFTA/LATAM/AP-NTSC), set to “OFF”.

FMI (Freq. Modulation Intercarrier)
- For NICAM/2CS sound system (EU/AP, except for APNTSC), set to “ON”.
- For AV-Stereo sound system (sets without NICAM), set to “OFF”.
- For dBx/non-dBx sound systems, set to “ON”.

NICAM Alignment
- For sets with NICAM/2CS (EU/AP, except for AP-NTSC) sound system, set to “79”.
- For all other sets (NAFTA/LATAM/AP-NTSC), set to “63” (= don’t care).

9. Circuit Descriptions, Abbreviation List, and IC Data Sheets

Index of this chapter:

Notes:

- Only **new** (not recently published) circuits are described in this chapter. For the other circuit descriptions, see the L01.1/M8 Service Manual.
- The descriptions below are a copy from the L04U manual, therefore sometimes a reference is made to region specific terminology or chassis (like the M8). Only the PIP description is new.
- Figures can deviate slightly from the actual situation, due to different set executions.
- For a good understanding of the following circuit descriptions, please use the diagrams in sections “Block Diagrams, ...”, and/or “Electrical Diagrams”. Where necessary, you will find a separate drawing for clarification.

9.1 Introduction

The "L04" chassis was a global TV chassis for the model year 2004 and is used for TV sets with large screen sizes (from 21 to 36 inch), in Super Flat and Real Flat executions (both in 4:3 and 16:9 variants).
There are three types of CRT namely the 100 degrees, 110 degrees and Wide Screen CRT.

- **The 100 deg. 4:3 CRT** is raster-correction-free and does not need East/West Correction (except when used in AP regions), therefore the corrections needed are Horizontal Shift, Vertical Slope, Vertical Amplitude, Vertical S-Correction, Vertical Shift, and Vertical Zoom for geometry corrections.
- **The 110 deg. 4:3 CRT** comes with East/West Correction. In addition to the parameter mentioned above, it also needs the Horizontal Parallelogram, Horizontal Bow, Horizontal Shift, East/West Width, East/West Parabola, East/West Upper and Lower Corners, and East/West Trapezium correction.
- **The Wide Screen TV sets** have all the correction of the 110 deg. 4:3 CRTs and also have additional picture format like the 4:3 format, 16:9, 14:9, 16:9 zoom, subtitle zoom, and the Super-Wide picture format.

In comparison to its predecessor (the L01.1/M8), this chassis has the following (new) features:

- **Audio:** The sound processor is part of the UOC processor (called “Hercules”).
- **Video:** Enhanced video features, video drivers, and Active Control.
- **Control:** Comparable to L01.1/M8 (e.g. Dual clock, I/O mapping, I/O switching).
- **Power Supply:** Adapted to supply the Hercules IC, and to enable 0.5 W Standby power dissipation. Also provisions are made for future extensions like DVD and iDTV.

The standard architecture consists of a Main panel (called "family board"), a Picture Tube panel, a Side I/O panel, and a Top Control panel. The Main panel consists primarily of conventional components with some surface mounted devices in the audio and video processing part.

The functions for video/audio processing, microprocessor (P), and CC/Teletext (TXT) decoder are all combined in one IC (TDA1200x, item 7200), the so-called third generation Ultimate One Chip (UOC-III) or “Hercules”. This chip is mounted on the “solder” side of the main panel, and has the following features:

- Control, small signal, mono/stereo, and extensive Audio/ Video switching in one IC.
- Upgrade with digital sound & video processing.
- Alignment free IF, including SECAM-L/L1 and AM.
- FM sound 4.5/5.5/6.0/6.5, no traps/bandpass filters.
- Full multi-standard colour decoder.
- One Xtal reference for all functions (microprocessor, RCP, TXT/CC, RDS, colour decoder, and stereo sound processor).

The tuning system features 181 channels with on-screen display. The main tuning system uses a tuner, a microcomputer, and a memory IC mounted on the main panel. The microcomputer communicates with the memory IC, the customer keyboard, remote receiver, tuner, signal processor IC and the audio output IC via the I2C bus. The memory IC retains the settings for favourite stations, customer-preferred settings, and service / factory data.
The on-screen graphics and closed caption decoding are done within the microprocessor where they are added to the main signal.

The chassis uses a Switching Mode Power Supply (SMPS) for the main voltage source. The chassis has a 'hot' ground reference on the primary side and a cold ground reference on the secondary side of the power supply and the rest of the chassis.

9.2 Power Supply

9.2.1 Block Diagram

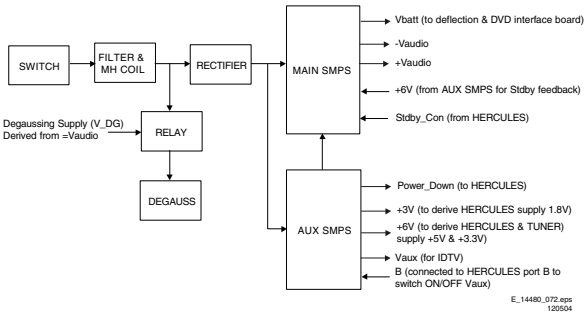


Figure 9-1 Block diagram power supply

Stdby_con Signal
The Hercules generates this signal. This line is logic “low” (0 V) under normal operation and in semi-Standby of the TV, and is “high” (3.3 V) during Standby.

Power_down Signal
The AUX SMPS generates this signal. It is logic “high” (3.3 V) under normal operation of the TV and goes “low” (0 V) when the AC power (or Mains) input voltage supply goes below 70 V_ac.

B (Hercules Port)
This port is used to switch the AUX SMPS output V_aux “ON/ OFF”. This is required for DVD and iDTV (for future extensions).

9.2.2 Timing Diagrams

Power ON - To Standby - Out of Standby - Power OFF

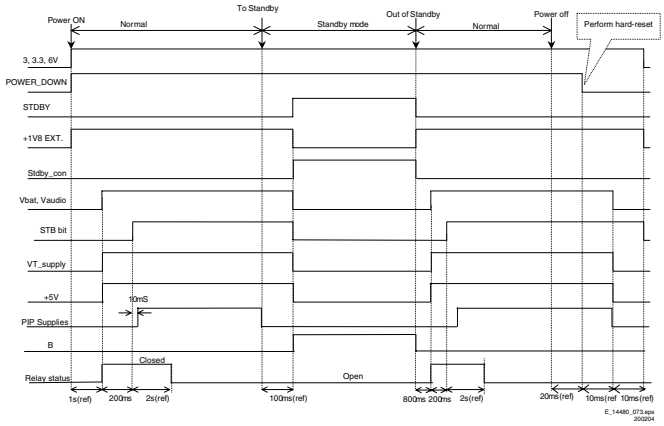


Figure 9-2 Timing diagram Standby

Power ON - To Semi Standby - Out of Semi Standby - Power OFF

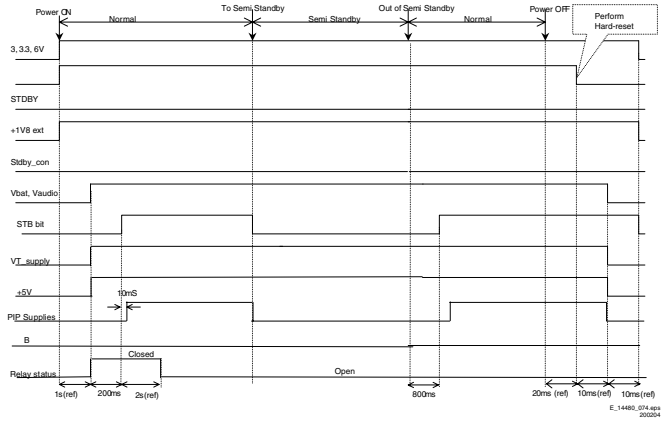


Figure 9-3 Timing diagram Semi Standby

9.2.3 Start-up Sequence

When the set is connected to the AC power, the rectified line voltage (via winding 4-5 of L5531 connected to pin 14 of IC7531) will start the internal voltage source to charge the V_cc capacitor (C2532). The IC starts to switch as soon as the V_cc reaches the V_cc start level of 9.5 V. This supply is automatically taken over by winding 1-2, as soon as the V_cc is high enough, and the internal supply source will stop (for high efficiency switching).

Table 9-1 Pinning overview TEA1523

Pin	Symbol	Description
2	Gnd	This pin is Ground of the IC.
3	V_cc	This pin is connected to the supply voltage. An internal current charges the V_cc capacitor (2532), and the start-up sequence is initiated when this voltage reaches a level of 9.5 V. Note: The output power is disabled when the voltage gets below 9 V (UVLO). Operating range is between 0 to 40 V.
5	RC	Frequency setting
6	REG	This pin is connected to the feedback loop. The pin contains two functions: 1) Between 1 to 1.425 V it controls the "on" time. 2) Above the threshold of 3.5 V, it is possible to initiate "burst mode" standby.
11	Demag	This pin is connected to the V_cc winding of 5531. It has three functions: 1) During Magnetization, the input voltage is sensed to compensate OCP level for OPP. 2) During demagnetization, the output voltage is sensed for OVP and 3) A comparator is used to prevent continuous conduction when output is overloaded.
12	Sense	This pin contains three different functions.: 1) Detection of soft start, protection levels of 2) OCP, and 3) SWP.
14	Drain	This pin is connected to the drain of the switch or center tap of the transformer. It contains three functions: 1) M-level (mains-dependent operation-enabling level), 2) Supply for start-up current, and 3) Valley detection.

As C2532 of IC7531 is charged, it will also start to charge the V_cc capacitor (C2511) of IC7511. Via resistor R3519 and C2511, the TEA1506 starts to switch as soon as the V_cc voltage reaches the V_cc start level of is about 11 V. The V_cc voltage is automatically taken over by the main transformer L5512 (winding 2-3) when the V_cc is high enough (when this voltage is even higher than the voltage on C2511, there is no current flow from C2532 to C2511 due to diode D6512).

Table 9-2 Pinning overview TEA1506

Pin	Symbol	Description
2	Vcc	This pin is connected to the supply voltage. When this voltage is high (Vcc_start level, about 11 V), the IC will start switching. When the voltage is lower than Vcc_uvlo (about 8.7 V), the IC will stop switching.Note: This pin is not self supplied by internal source like in TEA1507
3	Gnd	This pin is Ground of the IC.
6	Ctrl	This pin is connected to the feedback loop. The pin will control the "ON" time between 1 V to 1.5 V.
7	Demag	This pin is connected to the Vcc winding of 5512. It contains three functions: 1) During magnetization, the input voltage is sensed to compensate OCP level for OPP, 2) During demagnetization, the output voltage is sensed for OVP and 3) a comparator is used to prevent continuous conduction when the output is overloaded.
9	Sense	This pin contains three different functions: 1) detection of soft start, protection levels of 2) OCP, and 3) SWP.
11	Driver	This pin will drive the (MOSFET) switch.
12	HVS	This is High Volt Spacer (n.a.)
14	Drain	Connected to the Drain of the external MOSFET switch, this is the input for valley sensing and initial internal supply.

9.2.4 Standby Mode

In this mode, IC7511 (TEA1506) will be totally disabled. So there is no voltage on the main transformer output. But IC7531 (TEA1523) will still work and will provide the necessary output voltages (6V -> 5V, 3.3V, 3V -> 1.8V) to the Hercules (IC7200).

Table 9-3 PSU voltage overview

Voltage	Normal operation	Stdby mode
V_batt	130 - 143 V	0 V
V_audio	+/- 15.5 V	0 V
+6V	6 V	6 V
+3V	3 V	3 V
Stdby_con	0 V	3.3 V

9.3 Deflection

9.3.1 Synchronization

Before the Hercules (IC7200) can generate horizontal drive pulses, the +3.3V supply voltages must be present. After the start up command of the microprocessor (via I2C), the Hercules outputs the horizontal pulses. These horizontal pulses begin “initially” with double line frequency and then change “gradually” to line frequency in order to limit the current in the line stage (slow-start).

The VDRA and VDRB signals are the balanced output currents (sawtooth shaped) of the frame oscillator (pins 106 and 107 of the Hercules). These output signals are balanced, so they are less sensitive to disturbances.

There is a current source inside the UOC at pin 102. This pumps energy in the capacitor connected to this pin producing a pure saw tooth. The vertical drive signals and the E/W correction signal are derived.

Pin 108 is the East-West drive (or AVL), and it is a single ended current output. The correction for “horizontal width for changed EHT” from this pin is available by setting the HCO bit to “1”.

The Phase-2 Compensation available at pin 113 gives frame correction for high beam currents. The phase compensation signal is used to correct the phase of the picture from the horizontal drive signal.

Pin 63 is the SANDCASTLE output (contains all sync info) and also HORIZONTAL FLYBACK (HFB) input.
Pin 97 is the EHT tracking/over-voltage protection pin. The HCO bit can switch on the tracking on EW. If the voltage at pin 97 exceeds 3.9 V, the over-voltage protection will be activated and the horizontal drive is switched “OFF” via a slow stop.

9.3.2 Horizontal Deflection

There are several executions (depending on the CRT):
- **Sets without East-West correction.** The principle of the horizontal deflection is based on the quasi-diode modulation circuit. This horizontal deflection circuit supplies the deflection current and auxiliary voltages from the LOT.
- **Sets with East-West correction.** The principle of the horizontal deflection is based on a diode modulator with east-west correction. This horizontal deflection circuit supplies the deflection current and auxiliary voltages from the LOT.
- **Sets with dynamic East-West correction.** The principle of the horizontal deflection is based on a diode modulator with dynamic east-west correction for picture tubes with inner pincushion. This horizontal deflection circuit supplies the deflection current and auxiliary voltages from the LOT.

Basic Principle
During a scan period, either the Line Transistor or diode(s) conduct to ensure a constant voltage over the deflection coil (that results in a linear current). During the flyback period, the Line Transistor stops conducting, and the flyback capacitor(s) together with the inductance of the deflection coil creates oscillation.

First Part of Scan
Pin 62 of the UOC delivers the horizontal drive signal for the Line Output stage. This signal is a square pulse of line frequency. L5402 is the flyback drive transformer. This transformer de-couples the line output stage from the UOC. It has a direct polarization. The flyback drive circuit works with the start-up supply taken from +6V of the Aux supply (and subsequently taking from VlotAux+9V). When the H-drive is high, TS7404 conducts, and transformer L5402 starts to store energy. The base of the line transistor TS7405 is low and therefore blocks. The current in the deflection coil returns from diode D6404.

Second Part of Scan
When the H-drive is low, TS7404 does not conduct, and the energy that is stored in the transformer will transfer to the secondary, making the base of the Line Transistor high. Then the Line Transistor starts to conduct. The current in the deflection coil returns from the transistor in another direction.

Flyback
At the moment the H-drive becomes high, the base of the Line Transistor becomes low. Both the Line Transistor and the Flyback Diode will block. There is an oscillation between the flyback capacitor C2412 and the deflection coil. Because of the inductance of the LOT, the Line Transistor cannot stop conducting immediately. After the Line Transistor is out of conduction, the flyback pulse is created. The flyback capacitor charges until the current in the deflection coil reduce to zero. Then it discharges through the deflection coil and the deflection current increases from the other direction. The flyback diode conducts and is back to the first part of the scan.

Linearity Correction
Because the deflection coil has a certain resistance, a picture without any linearity issues cannot be expected. L5401 is the linearity coil to compensate for this resistance. It is a coil with a pre-magnetized core. This correction is called linearity correction.

Horizontal S-Correction
Because the electronic beam needs to travel a longer distance to both sides of the screen than the centre, the middle of the screen would become narrower than both sides. To prevent this, a parabolic voltage is applied across the deflection coil during scan. To create this parabolic voltage, a capacitor called S-cap (C2417/C2418) is used as a voltage source during scan. The sawtooth current of the deflection through this capacitor creates the required parabolic voltage. This correction is called S-Correction.

Mannheim-Circuit
When the EHT is heavily loaded with a bright line, the flyback time can be increased a bit in this situation. As a result, the scan delays a bit causing a DC-shift to the right in the next line, which would create a small spike on the S-cap. This spike oscillates with the inductance of the deflection coil and the primary of LOT. The result is visible in vertical lines under horizontal white line. This is called the Mannheim-effect.

To prevent this from happening, a circuit called Mannheim-circuit is added. This consists of C2415, R3404, R3417 and D6406. During the scan, C2415 is charged via R3417. During the flyback, the S-correction parabola across the S-Cap C2417/C2418 is in its most negative, and D6406 conducts. Thus, C2415 is switched in parallel to C2417/C2418 during flyback. As C2415 is much larger than C2417/C2418, the voltage across C2415 reduces the Mannheim-effect oscillation.

Class D East-West Driver
To reduce the power loss of the normal used linear East-West amplifier, a class-D East-West circuit is used. To achieve this, the East-West parabola waveform EW_DRIVE from the Hercules (frame frequency) is sampled with a saw tooth (line frequency) taken from the line aux output. Then a series of width-modulated pulses is formed via two inverted phase amplifiers, filtered by an inductor, which then directly drive the diode modulated line circuit.

East-West Correction
To achieve a good geometry, **dynamic** S-correction is needed. The design is such that the tube/yoke needs East-West correction. Besides that, an inner pincushion is present after East-West correction. The line deflection is modulated with a parabolic voltage (frame frequency). In this way it is not so much at top and bottom, and much more in the middle.

Upon entering the picture geometry menu in the SAM mode, the following corrections will be displayed.
- EWW: East West Width.
- EWP: East West Parabola.
- UCP: Upper Corner Parabola.
- LCP: Lower Corner Parabola.
- EWT: East West Trapezium.

The East-West drive circuit realizes them all. The settings can be changed by a remote control. All changed data will be stored into the NVM after the geometry alignment.

Panorama
For Wide Screen sets, the S-correction of the picture has to adapt between the different picture modes. In particular, between 16:9 Wide Screen and 4:3 picture modes. This is achieved with the (separate) Panorama circuit (see diagram "G"). A signal (I2SDI1) from the UOC controls the state of TS7463. When in the normal 16:9 Wide Screen mode, the signal is "LOW" and therefore TS7463 is switched "OFF". When the 4:3 mode is selected, this signal from the UOC is pulled "HIGH", switching TS7463 "ON". The relay 1463 on the Panorama panel is subsequently turned "ON" and, in effect, paralleling capacitor C2475/C2474 to the S-Cap C2469/ C2470. This changes the overall effective S-correction. The relay is switched "ON" in 4:3 and Superwide picture modes.

9.3.3 Auxiliary Voltages

The horizontal deflection provides various auxiliary voltages derived either directly or indirectly from the secondary pins of the LOT:
- +9V: This supplies the Hercules's flyback driver.
- +11V: This supplies the frame amplifier.
- -12V: This supplies the frame amplifier.
- 50V: This supplies the frame amplifier.
- Filament: This supplies the heater pins of the picture tube.
- VideoSupply (+ 200 V from primary side of LOT): This supplies the RGB amplifier and Scavem circuit at the CRT panel.

Notes:
- The V_T voltage (to tuner) is drawn from V_batt.
- The EHT voltage is generated by the Line Output Transformer (LOT). The Focus and Vg2 voltages are created with two potentiometers integrated in the transformer.

9.3.4 Beam Current

The beam current is adjusted with R3451 and R3452. The components R3473, R3453 and C2451 determine the EHT_info characteristic. The voltage across C2412 varies when the beam current changes. This EHT_info is used to compensate the picture geometry via pin 97 of the Hercules when the picture changes rapidly, and compensate the phase 2 loop via pin 113 of the Hercules. Also from the EHT_info line, a BCL signal is derived and sent to the Hercules for controlling the picture's contrast and brightness.

When the picture content becomes brighter, it will introduce:
- Geometry distortion due to the impedance of the LOT causing the EHT to drop.
- Picture blooming due to the picture characteristics

Because of the above mentioned, we will need a circuit for Beam Current Limiter (BCL) and EHT compensation (EHT_info). These two circuits derive the signal from the picture tube current info through LOT pin 10.

BCL
- When the BCL pin voltage goes to 2.8 V, the Hercules will start to limit CONTRAST gain.
- When it reaches 1.7 V, then the BRIGHTNESS gain limit will start to react.
- When BCL pin voltage goes to 0.8 V, the RGB will be blanked.

Components TS7483, R3490, R3491, R3492, and C2483 are for fast beam current limiting (e.g. with a Black-to-White pattern).

Components R3454, D6451, D6450, C2453, R3493, and C2230 are for average beam current limiting. C2453 and R3493 also control the timing where average beam current limiting is more active or less active.

EHT_info
The "PHI2 correction" is to correct the storage time deviation of the Line Output Transistor, which is causing geometry distortion due to brightness change.
Line EHT_info is to correct the geometry distortion due to EHT deviation.
Both of them feedback through the EHTO and PH2LF pin, and correct the geometry through the East-West circuit.

Power Down
The power down connection is for EHT discharge during AC Power "OFF" state. In the Hercules, if EHT_info > 3.9 V, it will trigger the X-ray protection circuit via a 2fH soft stop sequence. The Hercules bits OSO (Switch OFF in Vertical Over scan) and FBC (Fixed Beam Current Switch OFF) will discharge the EHT with 1mA cathode current at over-scan position.
During switch-off, the H_out frequency is doubled immediately and the duty cycle is set to 25% fixed, during 43 ms. The RGB outputs are driven "high" to get a controlled discharge of the picture tube with 1 mA during 38 ms. This will decrease the EHT to about half the nominal value (= safety requirement). When bit OSO is set, the white spot/flash during switch-off will be written in overscan and thus will not be visible on the screen. Careful application must guarantee that the vertical deflection stays operational until the end of the discharge period.

9.3.5 DAF

The Dynamic Astigmatic Focus (DAF) circuit is required by 34RF sets only. It provides vertical DAF and horizontal DAF. Both of the parabola signals are derived through integration by using chassis available signals:
- The vertical parabola is using RC integration (via R3403 and C2401) on the Frame sensing resistor saw tooth (Frame_FB).
- The horizontal parabola is obtained by 2 RC integration (R3409, R3410, C2402, C2403) on the +9 V LOT output.

Both of the parabolas are added on the output stage through adder TS7402 and TS7403. The collector of TS7402 emitter-drives TS7401 and is amplified by pull up resistor R3411. D6401 and C2405 provide the rectified supply voltage.

9.3.6 X-ray Protection

The X-ray protection circuit rectifies the filament voltage and uses it to trigger TS7481 when the EHT is too high. TS7481 is biased at "OFF" condition by D6480, R3482, and R3483 during normal operation. When the EHT goes too high, the voltage across R3482 will tend to increase as well, while the voltage across D6481 is fixed. Up to certain level (triggering point), TS7481 will be "on" and will force the EHT_info > 3.9 V. The chassis will be shut down through a soft stop sequence.

9.3.7 Vertical Deflection

The Frame stage consists fully of discrete components. This has the advantage for better flash behaviour than when an IC was used.

The Frame differential drive signal from the Hercules comes from a current source. Resistors R3460 and R3461 convert them into a voltage, and feed them into the differential amplifier TS7455 and TS7456. The output of TS7456 is input to the next amplification stage of TS7452. Finally, TS7451 and TS7453 deliver the Vertical yoke current to the coil and feedback through the sensing resistors R3471 and R3472.
D6458 and TS7454 are used to bias TS7451 and TS7453, to get rid of zero crossovers, which can cause horizontal lines at the screen centre.
The negative supply is from -12V and the positive scanning supply is from +12V through D6459. The flyback supply is derived from D6455, D6456 and C2456. This circuit is a voltage doubler, which stores energy in C2456 during the Line flyback

period and delivers the energy to C2465 during the Line scanning period. Throughout the Frame period, the charging and discharging of C2456 works alternatively. However, at the first half of the Frame scanning, TS7451 is “ON” and consumes all the charge from C2456. When entering 2nd half Frame period, TS7451 is “OFF”, so C2456 will gradually charge up to the required flyback supply.

C2463, R3464 and D6457 are for boosting the base voltage of TS7451 during the flyback period and the 1st half Frame period as well. C2463 is charged by D6457 during the 2nd half scanning. R3467 and R3468 are for oscillation damping.

The V_guard protection is to protect the Frame stage if a fault condition happens. The V_guard will sense the pulse with voltage > 3.8 V and period < 900 us. Any signal out of this range will be considered as fault, and the chassis will be shut down.

9.3.8 Tilt and Rotation

The rotation control signal is a PWM output from the UOC. It is filtered by R3252, R3246, R3259 and C2259. The DC voltage after filtering at C2259 will be amplified by R3245 (Main Board) and R3390 (CRT panel).
The output stage functions similarly as in L01.1/M8 with rotation IC TDA8941P. TS7331/TS7382 and TS7332/TS7381 will function alternatively corresponding to the rotation setting.

9.3.9 CRT panel

The RGB amplifier stage is exactly the same as in L01.1/M8. However, the RGB amplifier IC has been changed to TDA6107AJF or TDA6108AJF. The “A” indication is with gain of “80” rather than “50” in L01.1/M8. The diode D6332 used in the former chassis, to solve the bright screen during start up, is not required because this IC has the error correction implemented.

Scavem
In certain versions, the Scavem feature is used to enhance the sharpness of the picture. The RGB signals are first differentiated and subsequently amplified before feeding to an auxiliary coil known as the SVM coil. The current, flowing through the SVM coil during the picture intensity transients, modulates the deflection field and thus the scan velocity.

During the first half of the intensity increase, the scan velocity is increased (thus decreasing the current density by spreading it on a wider area). During the second half of the intensity increase, the scan velocity is decreased (increasing the current density by concentrating it on a smaller area). The increasing current density transition is sharpened. A decreasing current density transition is processed in a similar way and is also sharpened.

In this chassis the SCAVEM signal is different from its predecessor because the Hercules generates the differential SCAVEM signal inside the IC.
The supply of the SCAVEM is taken from V_bat through a 1k5 / 5 W resistor. Compared with the L01.1/M8, this has the advantage of getting better performance for the pattern with tremendous SCAVEM current (like V_sweep). In this former chassis, because the supply was taken from the 200 V through a 8k2 / 5 W resistor, the supply dropped significantly during a large SCAVEM current. In this chassis, the drop due to the pattern will be less because of the lower supply voltage impedance.
In the Main Board, 1st stage amplification is taken care by 7208 with the pull up resistors (3361, 3387) located in the CRT panel.

TS7361 and TS7362 is the current buffer delivering the current to the output stage. The diode D6361 is to lightly bias these transistors, to get rid of the zero crossover of the stage.

After that, the signal is AC-coupled to TS7363 and TS7364 where the emitter resistors (R3364 and R3370) will determine the final SCAVEM current. TS7363 and TS7364 are biased by R3363, R3366, R3367 and R3368.
C2387, R3388, R3389, R3365, R3369, C2384, and C2385 are used for suppressing unwanted oscillations.
The function of TS7376 is to limit the SCAVEM current from going too high. It basically senses the voltage after R3373 and clamps the SCAVEM signal through D6367 and C2376.

9.4 Control

The Micro Controller is integrated with the Video Processor, and is called the Hercules. For dynamic data storage, such as SMART PICTURE and SMART SOUND settings, an external NVM IC is being used.
Another feature includes an optional Teletext/Closed Caption decoder with the possibility of different page storage depending on the Hercules type number.

The Micro Controller ranges in ROM from 128 kB with no TXT-decoder to 128 kB with a 10 page Teletext or with Closed Caption.

9.4.1 Block Diagram

The block diagram of the Micro Controller application is shown below.

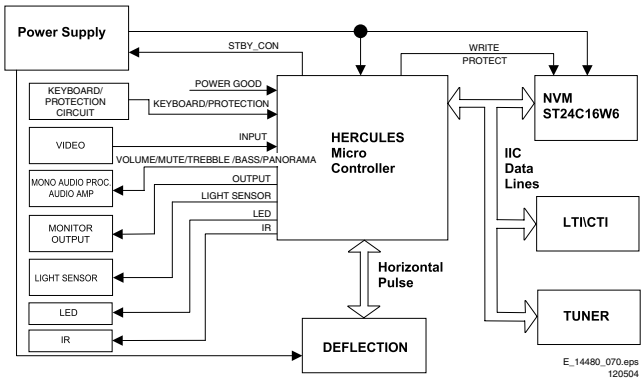


Figure 9-4 Micro Controller block diagram

9.4.2 Basic Specification

The Micro Controller operates at the following supply voltages:
- +3.3 V_dc at pins 33, 125, and 19.
- +1.8 V_dc at pins 126, 36, and 33.
- I2C pull up supply: +3.3V_dc.

9.4.3 Pin Configuration and Functionality

The ports of the Micro Controller can be configured as follows:
- A normal input port.
- An input ADC port.
- An output Open Drain port.
- An output Push-Pull port.
- An output PWM port.
- Input/Output Port

The following table shows the ports used for the L04 control:

Table 9-4 Micro Controller ports overview

Pin	Name	Description	Configuration
32	INT0/ P0.5	IR	INT0
31	P1.0/ INT1	PWRDOWN	INT1
30	P1.1/ T0	LED	P1.1
27	P0.4/ I2SWS	(for future use)	-
26	P0.3/ I2SCLK	(for future use)	-
25	P0.2/ I2SDO2	SEL_SC2_INTERFACE/ SDM	P0.2
24	P0.1/ I2SDO1	(for future use)	P0.1
23	P0.0/ I2SDI/O	Panorama	P0.0
22	P1.3/ T1	Write Protect	P1.3
21	P1.6/ SCL	SCL	SCL
20	P1.7/ SDA	SDA	SDA
18	P2.0/ TPWM	VOL_MUTE	P2.0
17	P2.1/ PWM0	ROTATION	PWM0
16	P2.2/ PWM1	SEL_LL'/M	P2.2
15	P2.3/ PWM2	STANDBY_CON	P2.3
14	P3.0/ ADC0	Light Sensor	ADC0
13	P3.1/ ADC1	(for future use)	-
10	P3.2/ ADC2	(for future use)	-
9	P3.3/ ADC3	KEYBOARD	ADC3
7	P2.4/ PWM3	A (for future use)	P2.4
6	P2.5/ PWM4	B (for future use)	P2.5
3	P1.2/ INT2	C (for future use)	INT2
2	P1.4/ RX	E (for future use)	-
1	P1.5/ TX	D (for future use)	-

The description of each functional pin is explained below:

- **LED.** This signal is used as an indication for the Standby, Remote and Error Indicator. Region diversity:
  - During protection mode, the LED blinks and the set is in standby mode.
  - During error conditions it blinks at a predefined rate.
  - After receiving a valid RC-5 or local keyboard command it flashes once.
  - For sets with error message indication, the LED blinks when message is active and the set is in standby mode.

Table 9-5 LED signal diversity

LED	Europe		AP/ LATAM		NAFTA	
0	LED brighter	Standby	LED lighted	Standby	LED lighted	Normal
1	LED dimmer	Normal	LED "OFF"	Normal	LED "OFF"	Standby

- **SCL.** This is the clock wire of the two-wire single master bi-directional I2C bus.
- **SDA.** This is the data wire of the two-wire single master bi-directional I2C bus.
- **STDBY_CON.** The Hercules generates this signal. This can enable the MAIN SMPS in normal operation and disable it during Standby. It is of logic “low” (0 V) under normal operation and “high” (3.3 V) during Standby.
- **IR.** This input pin is connected to an RC5 remote control receiver.
- **SEL-IF-LL’/ M-TRAP.** For AP: All L04 AP sets are Multi System QSS set. This is an output pin to switch the Video SAW filter between M system and other systems.
  - 0: NTSC M (default)
  - 1: PAL B/G, DK, I, L
- **Write Protect.** The global protection line is used to enable and disable write protection to the NVM. When write to the NVM is required, pin 7 of the NVM must be pulled to logic ‘0’ first (via Write_Protect of the micro-controller pin) before a write is performed. Otherwise pin 7 of NVM must always be at logic “1”
  - 0: Disabled
  - 1: Enabled (default)
- **Mute.** This pin is use to MUTE the audio amplifier. It is configured as push pull.
- **Rotation.** This pin is configured as PWM for the Rotation feature. The output of the PWM is proportional to the feature control.
- **Light Sensor.** This pin is configured as ADC input for the Light Sensor.
- **Sel_SC2_Interface.** This pin is use to switch between the SC2_CVBS_OUT and the INTF_CVBS_OUT for the SCART_2_CVBS_OUT/ MONITOR_OUT signal.
  - 0: Hercules CVBS Output (default)
  - 1: Interface CVBS Output
- **PWRDOWN.** The AUX SMPS generates this signal. Logic “high” (3.3 V) under normal operation of the TV and goes “low” (0 V) when the Mains input voltage supply goes below 70 V_ac.
- **Keyboard.** Following are the Keyboard functions and the step values (8 bit) for it.

Table 9-6 Local keyboard values

Function	Voltage (V_dc)	Step values (8 bit)
NAFTA Standby	0	0 - 6
Ch +	0.43	7 - 33
Exit Factory (Ch- and Vol-)	0.69	34 - 53
Ch -	0.93	54 - 73
Menu (Vol - and Vol +)	1.19	74 - 96
Vol -	1.49	97 - 121
DVD Eject	1.8	122 - 147
Vol +	2.12	148 - 169

- **SDM.** This pin is configured as Open Drain during the cold start only. If this pin is shorted to ground during cold start, it will enter the SDM mode (for Service use).
- **ISP.** This pin is configured as Open Drain during the cold start only. If this pin is shorted to ground during cold start, it will enter the ISP mode (for Service use).
- **PANEL.** This pin is configured as Open Drain during the cold start only. If this pin is shorted to ground during that, then it will enter to the PANEL mode.
- **ResetEnabled.** This is an output pin to switch the control transistor (pos. TS7202) “high” or “low” for the reset of 1.8 V in case there is a corruption in the Hercules.

9.5 Tuner and IF

The tuner used in this chassis comes from two sources, from Philips and from Alps. Both tuner sources have the same pin configuration so they are 1 to 1 compatible except for the software, which will be selected by means of Option Settings.

Some features:

- Multi-Standard alignment free PLL-IF, incl. SECAM L/L’.
- Integrated IF-AGC time constant.
- Integrated sound band-passes and traps (4.5 / 5.5 / 6.0 / 6.5 MHz).
- Group delay compensation (for NTSC and for PAL).
- QSS versions with digital Second-Sound-IF SSIF (AM demodulator for free).
- FM mono operation possible: Inter-Carrier or QSS.

9.5.1 Diversity

The following Tuners can be present (depending on the region and the set execution):

- Normal tuner without PIP.
- FM radio tuner without PIP.
- Normal tuner with PIP (main tuner with splitter).
- FM radio set with PIP (PIP tuner with splitter).

The SAW filter used, depends on the application concept (whether it is a QSS concept or an Intercarrier):

- OFWM3953M for QSS Video.
- OFWK9656M for QSS Audio.
- OFWM1971M for Intercarrier.

9.5.2 Pin Assignments and Functionality

Pin assignment of the Tuner:

Table 9-7 Pinning Tuner

Pin	Pin Description	DC Voltages
1	RF-AGC	4V for Maximum Gain < 4V for Strong Signal Condition
2	FM Radio Input or N.C	-
3	NC (Address Pin)	-
4	SCL	0 to 3.3 V_dc
5	SDA	0 to 3.3 V_dc
6/7	Supply Voltage	5 V_dc +/- 0.25 V
8	N.C	-
9	Tuning Supply Voltage	30 to 35 V_dc
10	FM Radio IF Output/Ground	-
11	TV IF Output	-

Pin assignment of the several SAW filters (depends on region/ execution):

Table 9-8 Pinning SAW filters

Pin	QSS Video (item 1002)	QSS Video (item 1003)	QSS Audio (item 1001)	Intercarrier (item 1002)
1	Input	Input	Input	Input
2	Input Ground	Input Ground	Switching Input	Input Ground
3	Ground	Ground	Ground	Ground
4	Output	Output	Output	Output
5	Output	Output	Output	Output
6	-	n.c.	-	-
7	-	n.c.	-	-
8	-	Ground	-	-
9	-	Free	-	-
10	-	Switching input	-	-

The table below shows the switching behaviour of SAW filter.

Table 9-9 Switching behaviour SAW filter

	Condition	
	High	Low
System	M	BG/DK/I/L

Note: The logic level is measured at the base of transistor 7001.

9.5.3 Option Settings

The option settings for the Tuner type can be found in Option setting 1 of the SAM mode. The Option settings for Option 1 are as follows:

- Option Byte 1
  - Bit 7: OP_PHILIPS_TUNER
  - Bit 6: OP_FM_RADIO
  - Bit 5: OP_LNA
  - Bit 4: OP_ATS
  - Bit 3: OP_ACI
  - Bit 2: OP_UK_PNP
  - Bit 1: OP_VIRGIN_MODE
  - Bit 0: OP_CHINA

For more details on the option settings, please refer to the chapter 8 “Alignments”.

9.6 Source Select

For this chassis, the audio/video source selection is controlled via the Hercules.

The Audio/Video Source Select is one of the more complex functions due to its diversity and complex switching. The Audio/ Video Source Select comprises of the following components:

- The Hercules itself for Mono Audio and Video Source Selection.
- The HEF switch for Stereo Audio as well as Video Selection.

9.6.1 Options

The option settings for the Source Selection can be found in Option settings of the SAM mode. The Option settings for Option 5 are as follows:

- Option Byte 5
  - Bit 7: AV1
  - Bit 6: AV2
  - Bit 5: AV3
  - Bit 4: CVI
  - Bit 3: SVHS2
  - Bit 2: SVHS3
  - Bit 1: HOTEL MODE
  - Bit 0:

For more detail on the option settings, please refer to the chapter 8 “Alignments”.

9.6.2 Diversity

The basic diversity of the Audio/Video Source Select is between the Mono and the Stereo sets and the number of Cinch/SCART’s as specified in the product specification. The table below shows the Audio/Video Source Select diversity for all regions:

Table 9-10 AV Source Select diversity

Pin	Symbol	Remark
51	R/Pr IN3	AV1 (CVI)
50	G/Y IN3	
49	B/Pb IN3	
52	INSSW3	
74	CVBS2/Y2	
95	AUDIO IN5 L	
94	AUDIO IN5 R	
73	AUDIO IN3 L	AV2 (SVHS)
72	AUDIO IN3 R	
71	CVBS3/Y3	
70	C2/C3	
80	AUDIO IN4 L	Side (SHVS)
79	AUDIO IN4 R	
78	CVBS4/Y4	
77	C4	
81	IFVO/SVO/CVBSI	Monitor Out
67	AUD OUT HP L	
66	AUD OUT HP R	
69	AUD OUT LS L (AUD OUT/AM OUT)	HP/ LS Out
68	AUD OUT LS R	
59	V IN (R/Pr IN2/CX)	Interface
58	U IN (B/Pb IN2)	
57	Y IN (G/Y IN2/CVBS-Yx)	
54	U OUT (INSSW2)	
76	AUDIO IN2 L	
75	AUDIO IN2 R	
86	DVBO/IFVO/FMRO	N.C.
65	CVBSO/PIP	PIP application
56	Y SYNC	100 nF
55	Y OUT	100 nF
53	V OUT (SWO)	N.C.
93	AUD OUT S L	N.C.
92	AUD OUT S R	N.C.

Table 9-11 SCART Source Select diversity

Pin	Symbol	Remark
51	R/Pr IN3	SCART 1
50	G/Y IN3	
49	B/Pb IN3	
52	INSSW3	
74	CVBS2/Y2	
86	DVBO/IFVO/FMRO	
95	AUDIO IN5 L	
94	AUDIO IN5 R	
93	AUD OUT S L	
92	AUD OUT S R	
71	CVBS3/Y3	SCART 2
70	C2/C3	
81	IFVO/SVO/CVBSI	
73	AUDIO IN3 L	
72	AUDIO IN3 R	
67	AUD OUT HP L	
66	AUD OUT HP R	
80	AUDIO IN4 L	Side I/O
79	AUDIO IN4 R	
78	CVBS4/Y4	
77	C4	
69	AUD OUT LS L (AUD OUT/AM OUT)	LS/ HP/ MON OUT
68	AUD OUT LS R	
59	V IN (R/Pr IN2/CX)	Interface
58	U IN (B/Pb IN2)	
57	Y IN (G/Y IN2/CVBS-Yx)	
54	U OUT(INSSW2)	
76	AUDIO IN2 L	
75	AUDIO IN2 R	
65	CVBSO/PIP	for PIP
56	YSYNC	100 nF
55	YOUT	100 nF
53	VOUT(SWO)	N.C.

9.6.3 Audio Source Selection

The signals coming out of the DEMDEC (internal demodulator/ decoder block of the Hercules) are selectable and consist of the following (depending on the transmission):
- DEC L/R (Can be NICAM, FM 2CS, or BTSC Stereo).
- Mono (Refers to fallback/forced Mono in Stereo Transmission).
- SAP.

For L04, the assigned I/O with respect to the Hercules is as follows:
- SCART1 or AV1 Input assigned to **Audio In 5**.
- SCART2 or AV2 Input assigned to **Audio In 3**.
- Side AV Input assigned to **Audio In 4**.
- External Interface Input assigned **to Audio In 2**.
- SCART1 Output assigned to **SCART Output**.
- SCART2 Output (EU) or Monitor Output (LA/NA/AP) assigned to **Headphone Output**.
- Constant Level Output assigned to **Loudspeaker Output**.

9.6.4 Video Source Selection

Video source selection is done inside the Hercules. Therefore it provides a video switch with 3 external CVBS inputs and a CVBS output. All CVBS inputs can be used as Y-input for Y/C signals. However, only 2 Y/C sources can be selected because the circuit has 2 chroma inputs.
All input signals are converted to YUV, and looped through an external interface. This to enable picture improvement features (like LTI/CTI) or PIP.

9.7 Video Processing

The Video Processor is basically the Hercules and the TDA9178 (CTI/LTI). Video processing is done in these two chips such as the Brightness Control, Contrast Control and so on.

Some features:
- Full YUV-loop interface (alternative functions: DVD, RGB or Y/C).
- Internal OSD insertion (not Saturation or Contrast controlled).
- Double window implementation.
- Linear / non linear scaling for 16:9 sets.
- Tint (hue) on UV signals (including DVD).
- Peaking, Coring, Black \ Blue \ White-stretch.
- Transfer-Ratio and Scavem (also on TXT).

9.7.1 Features

The features included in the Hercules are as follows:
- Brightness Control.
- Contrast Control.
- Saturation Control.
- Sharpness Control.
- Peak White Limiter.
- Beam Current Limiter.
- Black Stretch (Contrast Plus).

For sets with the TDA9178, there are two extra features:
- Luminance Transient Improvement (LTI).
- Colour Transient Improvement (CTI).

9.7.2 Block Diagram

Following diagram is the block diagram of the video processing part:

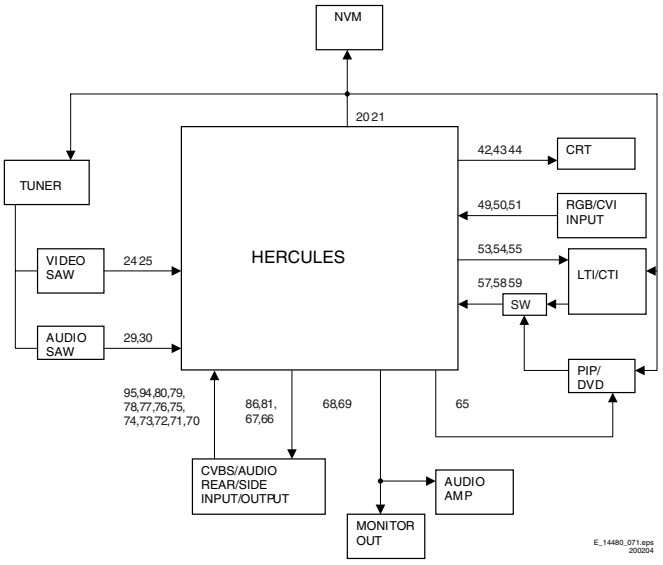


Figure 9-5 Video processing block diagram

9.7.3 LTI/CTI

The TDA9178 is an I2C-bus controlled IC (INCREDIBLE chip) with YUV interface. This IC can do mainly histogram processing, colour transient improvement (CTI) and line transient improvement (LTI).
- Luminance Vector Processing involves histogram function, which provides scene dependent contrast improvement, adaptive black and white point stretching.
- Colour Vector Processing involves skin tone correction, green enhancement and blue stretch.

- Spectral Processor involves step improvement processing, contour processing, smart sharpness control, colour dependant sharpness and Colour Transient Improvement.
- Noise detector, feature mode detector and cue flash functions.
- Demonstration mode shows all the improvement features in one picture.

Table 9-12 Pinning overview TDA9178

Pin	Symbol	Description
1	SC	Sandcastle input pin
2	n.c.	Not connected pin
3	ADEXT1	External AD-conversion #1 input pin
4	ADEXT2	External AD-conversion #2 input pin
5	ADEXT3	External AD-conversion #3 input pin
6	Y in	Luminance input pin
7	ADR	Address selection input pin
8	U in	-(B-Y) signal input pin
9	V in	-(R-Y) signal input pin
10	TP	Testpin, connected to ground
11	SCL	I2C-bus: clock input pin
12	n.c.	Not connected pin
13	n.c.	Not connected pin
14	SDA	I2C-bus: data input pin
15	DECDIG	Decoupling digital supply
16	V out	-(R-Y) signal output pin
17	U out	-(B-Y) signal output pin
18	V ee	Ground pin
19	Y out	Luminance output pin
20	V cc	Supply-voltage pin
21	S out	Luminance output for SCAVEM
22	CF	Cue-flash output pin
23	n.c.	Not connected pin
24	n.c.	Not connected pin

9.7.4 Options

The option settings allow for process of the video as per set specification. The option settings can be found in “Option 2” and “Option 6” in the SAM mode. The option settings are as follows:

- Option Byte 2
  - Bit 7:
  - Bit 6: OP_GREEN_UI
  - Bit 5: OP_CHANNEL_NAMING,
  - Bit 4: OP_LTI,
  - Bit 3: OP_TILT,
  - Bit 2: OP_FINE_TUNING
  - Bit 1: OP_PIP_PHILIPS_TUNER,
  - Bit 0: OP_HUE,
- Option Byte 6
  - Bit 7: OP_PERSONAL_ZAPPING,
  - Bit 6:
  - Bit 5: OP_FMTRAP
  - Bit 4: OP_COMBFILTER
  - Bit 3: OP_ACTIVE_CONTROL
  - Bit 2: OP_VIDEO_TEXT
  - Bit 1: OP_LIGHT_SENSOR,
  - Bit 0: OP_DUAL_TEXT

For more details on the option settings, please refer to the chapter 8 “Alignments”.

9.8 Audio Processing

The audio decoding is done entirely via the Hercules. The IF output from the Tuner is fed directly to either the Video-IF or the Sound-IF input depending on the type of concept chosen. There are mainly two types of decoder in the Hercules, an analog decoder that decodes only Mono, regardless of any standards, and a digital decoder (or DEMDEC) that can decode both Mono as well as Stereo, again regardless of any standards.

In this chassis, the analog decoder is used in two cases:

- It is used for AM Sound demodulation in the Europe SECAM LL’ transmission.
- It is used for all FM demodulation in AP AV-Stereo sets.

9.8.1 Diversity

The diversity for the Audio decoding can be broken up into two main concepts:

- The Quasi Split Sound concept used in Europe and some AP sets.
- The Inter Carrier concept, used in NAFTA and LATAM.

The UOC-III family makes no difference anymore between QSS- and Intercarrier IF, nearly all types are software-switchable between the two SAW-filter constructions.

Simple data settings are required for the set to determine whether it is using the Inter Carrier or the QSS concept. These settings are done via the “QSS” and “FMI” bit found in SAM mode. Due to the diversity involved, the data for the 2 bits are being placed in the NVM location and it is required to write once during start-up.

On top of that, it can be further broken down into various systems depending on the region. The systems or region chosen, will in turn affect the type of sound standard that is/are allowed to be decoded.

- For the case of **Europe**, the standard consists of BG/DK/I/LL’ for a Multi-System set. There are also versions of Eastern Europe and Western Europe set and the standard for decoding will be BG/DK and I/DK respectively. FM Radio is a feature diversity for the Europe sets. The same version can have either FM Radio or not, independent of the system (e.g. sets with BG/DK/I/LL’ can have or not have FM radio).
- For the case of **NAFTA** and **LATAM**, there is only one transmission standard, which is the M standard. The diversity then will be based on whether it has a dBx noise reduction or a Non-dBx (no dBx noise reduction).
- For the case of **AP**, the standard consists of BG/DK/I/M for a Multi-System set. The diversity here will then depends on the region. AP China can have a Multi-System and I/DK version. For India, it might only be BG standard.

9.8.2 Functionality

The features available in the Hercules are as follows:

- Treble and Bass Control.
- Surround Sound Effect that includes:
  - Incredible Stereo.
  - Incredible Mono.
  - 3D Sound (not for AV Stereo).
  - TruSurround (not for AV Stereo).
  - Virtual Dolby Surround, VDS422 (not for AV Stereo).
  - Virtual Dolby Surround, VDS423 (not for AV Stereo).
  - Dolby Pro-Logic (not for AV Stereo).
- Bass Feature that includes:
  - Dynamic Ultra-Bass.
  - Dynamic Bass Enhancement.
  - BBE (not for AV Stereo).
- Auto-Volume Leveller.
- 5 Band Equalizer.
- Loudness Control.

All the features stated are available for the Full Stereo versions and limited features for the AV Stereo

9.8.3 Audio Amplifier

The audio amplifier part is very straightforward. It uses the integrated power amplifier TDA2616Q, and delivers a maximum output of 2 x 10 W_rms.
The maximum operating condition for this amplifier is 21 V unloaded. Normal operating supply is from 7.5 V to 16 V.

Muting is done via the VOLUME_MUTE line connected to pin 2 of the amplifier-IC and coming from the UOC.

The following table shows pin functionality of the Audio Amplifier:

Table 9-13 Pinning overview TDA2616

Pin	Pin Name	Normal Operation
1	Input Left	Input AC signal
2	Mute	16 V_dc
3	Ground	0 V
4	Output L Channel	AC waveform
5	Supply Voltage (negative)	-16 V_dc
6	Output R Channel	AC waveform
7	Supply Voltage (positive)	+ 16 V_dc
8	Inverting inputs L and R	0 V
9	Input Right	Input AC signal

9.9 Picture in Picture (PIP)

The PIP application has two tuners, one with a splitter on the main chassis and another with "phono" input on the PIP panel. The same signal is injected to both tuners, so that it does not need separate auto tuning for the PIP tuner.

The TDA9887TS (item 7201) is an alignment free multi-standard vision and sound IF signal PLL demodulator for positive and negative modulation, including sound AM and FM processing.

The SDA9489 (item 7242) is a multi system colour decoder with many features such as: half screen size PIP, selectable YUV or YPbPr, 16:9 application, WSS detection, Closed Caption, and OSD display for PIP window etc.

The PIP power supply is based on the step down converter principle. The +9V input voltage is converted to +5V and +3.3V via the regulator (item 7501).

9.10 Abbreviation List

2CS	2 Carrier (or Channel) Stereo
ACI	Automatic Channel Installation: algorithm that installs TV sets directly from cable network by means of a predefined TXT page
ADC	Analogue to Digital Converter
AFC	Automatic Frequency Control: control signal used to tune to the correct frequency
AFT	Automatic Fine Tuning
AGC	Automatic Gain Control: algorithm that controls the video input of the feature box
AM	Amplitude Modulation
AP	Asia Pacific region
AR	Aspect Ratio: 4 by 3 or 16 by 9
ATS	Automatic Tuning System
AV	External Audio Video
AVL	Automatic Volume Leveller
BCL	Beam Current Limitation
B/G	Monochrome TV system. Sound carrier distance is 5.5 MHz
BTSC	Broadcast Television Standard Committee. Multiplex FM stereo sound system, originating from the USA and used e.g. in LATAM and AP-NTSC countries
CC	Closed Caption
CCC	Continuous Cathode Calibration
ComPair	Computer aided rePair
CRT	Cathode Ray Tube or picture tube
CSM	Customer Service Mode
CTI	Colour Transient Improvement: manipulates steepness of chroma transients
CVBS	Composite Video Blanking and Synchronization
CVI	Component Video Input
DAC	Digital to Analogue Converter
DBX	Dynamic Bass Expander or noise reduction system in BTSC
D/K	Monochrome TV system. Sound carrier distance is 6.5 MHz
DFU	Direction For Use: description for the end user
DNR	Dynamic Noise Reduction
DSP	Digital Signal Processing
DST	Dealer Service Tool: special remote control designed for dealers to enter e.g. service mode
DVD	Digital Versatile Disc
EEPROM	Electrically Erasable and Programmable Read Only Memory
EHT	Extra High Tension
EHT-INFO	Extra High Tension information
EPG	Electronic Programming Guide
EU	Europe
EW	East West, related to horizontal deflection of the set
EXT	External (source), entering the set via SCART or Cinch
FBL	Fast Blanking: DC signal accompanying RGB signals
FILAMENT	Filament of CRT
FM	Field Memory or Frequency Modulation
H	Horizontal sync signal
HP	Headphone
I	Monochrome TV system. Sound carrier distance is 6.0 MHz
I2C	Integrated IC bus
IF	Intermediate Frequency

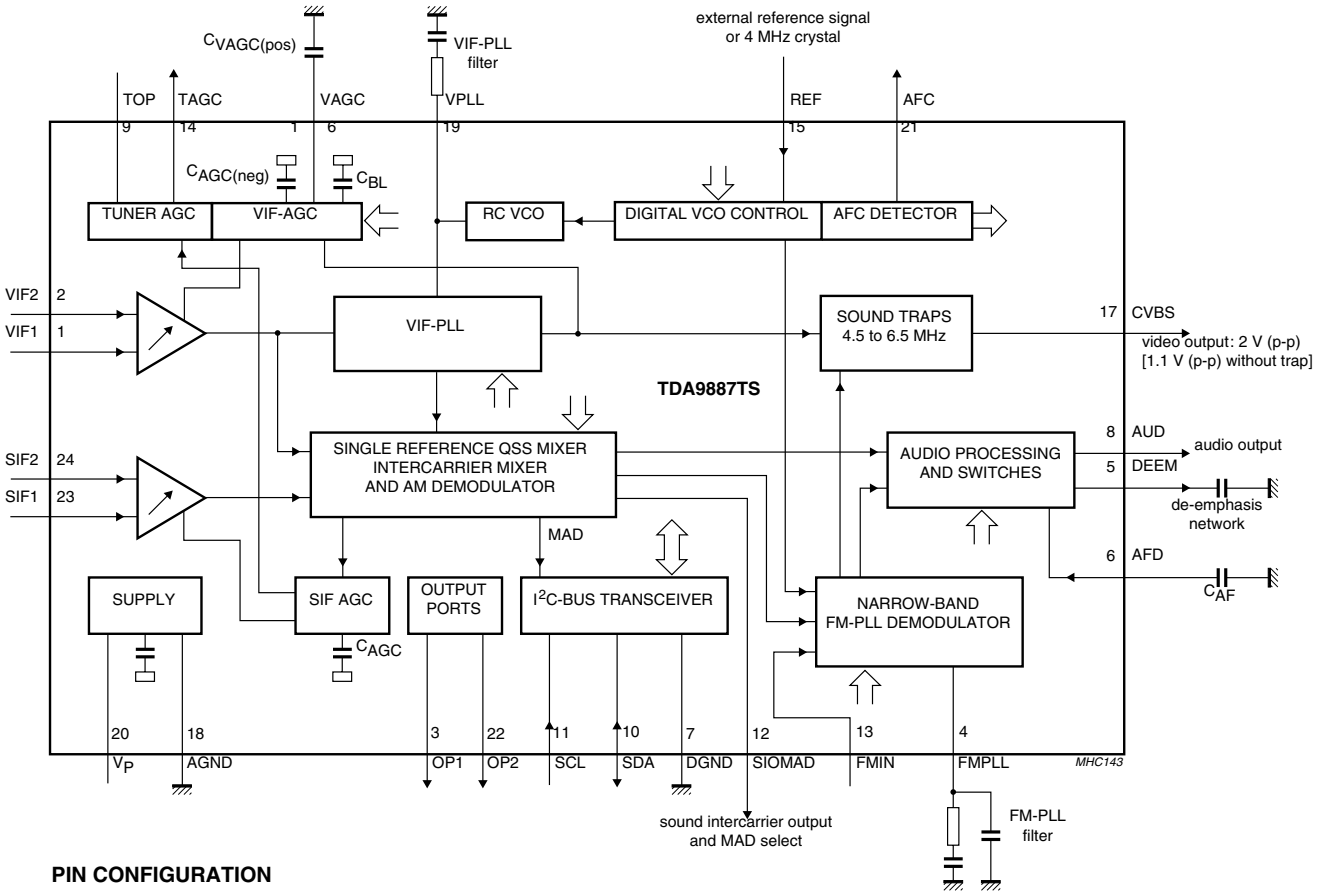
IIC	Integrated IC bus
ITV	Institutional TV
LATAM	Latin American countries like Brazil, Argentina, etc.
LED	Light Emitting Diode
L/L'	Monochrome TV system. Sound carrier distance is 6.5 MHz. L' is Band I, L is all bands except for Band I
LS	Large Screen or Loudspeaker
M/N	Monochrome TV system. Sound carrier distance is 4.5 MHz
MHEG	Multimedia and Hypermedia information coding Expert Group
NC	Not Connected
NICAM	Near Instantaneous Compounded Audio Multiplexing. This is a digital sound system, mainly used in Europe.
NTSC	National Television Standard Committee. Colour system mainly used in North America and Japan. Colour carrier NTSC M/N = 3.579545 MHz, NTSC 4.43 = 4.433619 MHz (this is a VCR norm, it is not transmitted off-air)
NVM	Non Volatile Memory: IC containing TV related data e.g. alignments
OB	Option Bit
OC	Open Circuit
OP	Option Byte
OSD	On Screen Display
PAL	Phase Alternating Line. Colour system mainly used in West Europe (colour carrier = 4.433619 MHz) and South America (colour carrier PAL M = 3.575612 MHz and PAL N = 3.582056 MHz)
PCB	Printed Circuit board
PLL	Phase Locked Loop. Used for e.g. FST tuning systems. The customer can give directly the desired frequency
POR	Power-On Reset
PTP	Picture Tube Panel (or CRT-panel)
RAM	Random Access Memory
RC	Remote Control handset
RGB	Red, Green, and Blue video signals
ROM	Read Only Memory
SDAM	Service Default / Alignment Mode
SAP	Second Audio Program
SC	Sandcastle: pulse derived from sync signals
S/C	Short Circuit
SCL	Serial Clock
SDA	Serial Data
SECAM	SEquence Couleur Avec Memoire. Colour system mainly used in France and East Europe. Colour carriers = 4.406250 MHz and 4.250000 MHz
SIF	Sound Intermediate Frequency
SS	Small Screen
STBY	Standby
SVHS	Super Video Home System
SW	Software
THD	Total Harmonic Distortion
TXT	Teletext
uP	Microprocessor
UOC	Ultimate One Chip
V	Vertical sync signal
V_BAT	Main supply voltage for the deflection stage (mostly 141 V)
V-chip	Violence Chip
VCR	Video Cassette Recorder
WYSIWYR	What You See Is What You Record: record selection that follows main picture and sound
XTAL	Quartz crystal
YC	Luminance (Y) and Chrominance (C) signal

9.11 IC Data Sheets

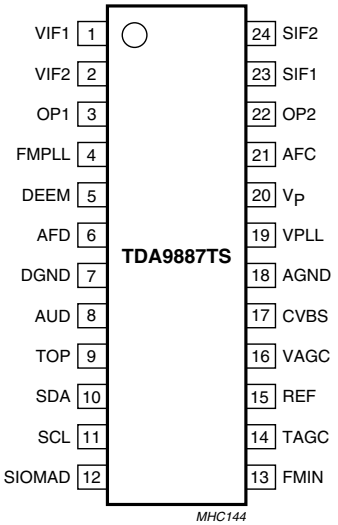
This section shows the internal block diagrams and pin layouts of ICs that are drawn as "black boxes" in the electrical diagrams (with the exception of "memory" and "logic" ICs).

9.11.1 Diagram F, TDA9887 (IC7201)

BLOCK DIAGRAM



PIN CONFIGURATION

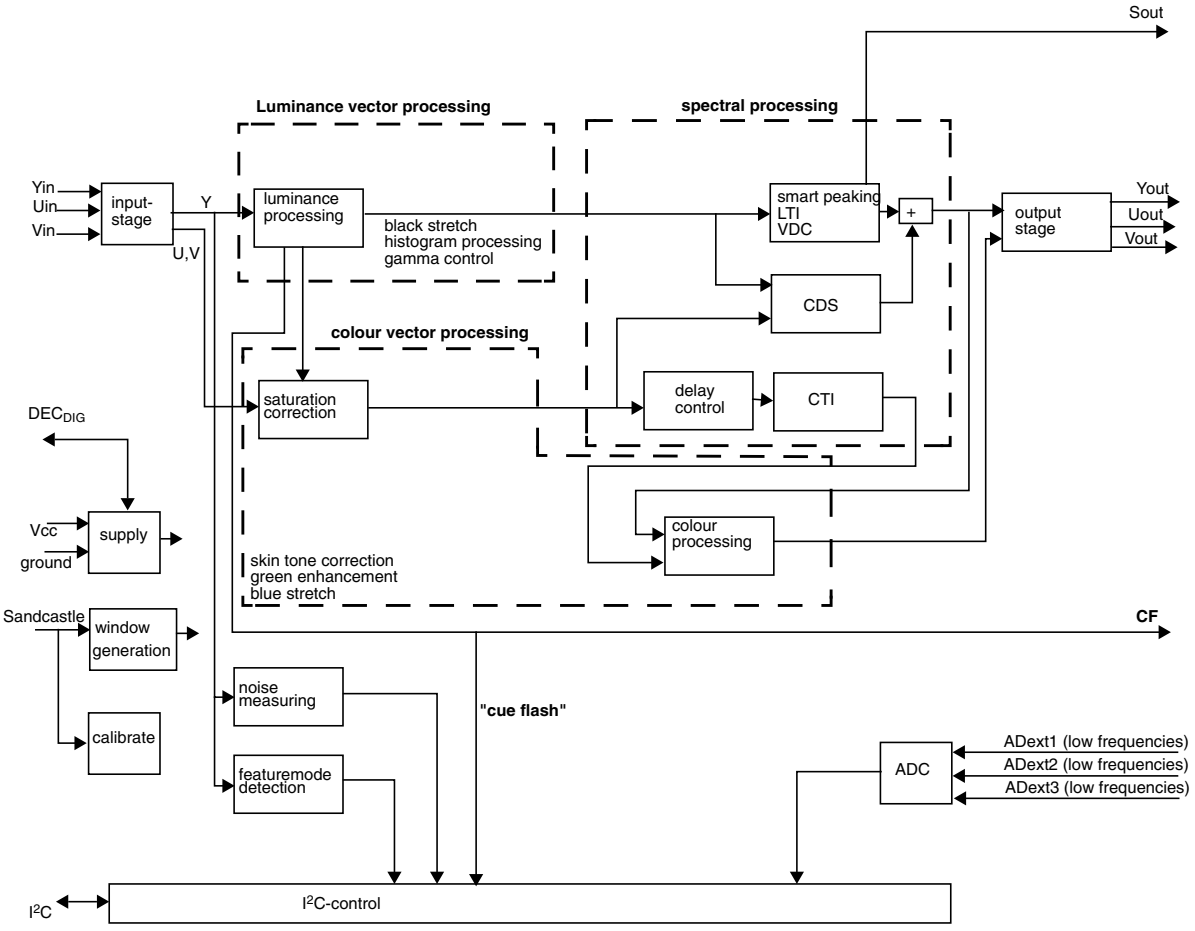


E_14480_129.eps
120504

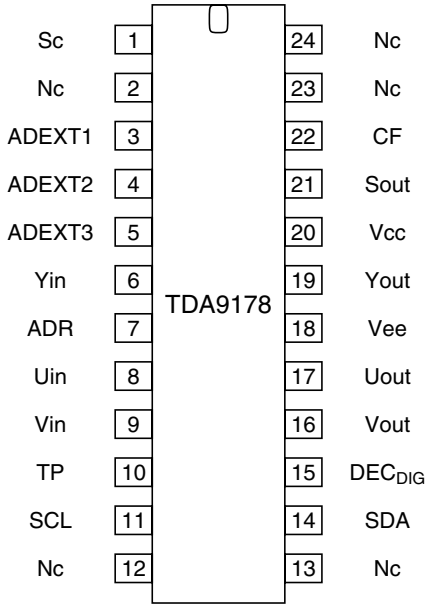
Figure 9-6 Internal Block Diagram and Pin Configuration

9.11.2 Diagram H, TDA9178 (IC7610)

BLOCK DIAGRAM



PIN CONFIGURATION



E_14480_075.eps
270204

Figure 9-7 Internal Block Diagram and Pin Configuration

10. Spare Parts List

Set Level per Model Number (CTN)

29PT5408/01

0601	Proc. Main SW	Download from website
0602	Proc. NVM SW	Download from website
1099▲	9301 984 90314	CRT A68ERF185X013/M
1116	3139 268 05821	Side I/O Assy [D]
8207	3104 311 07801	Cable 7P 400mm
8278	3104 311 03391	Cable 4P 1000mm
8280	3104 301 08562	Cable 5p/340/5p Wh

⏦

5203▲	2422 549 01315	Coil degaus 29"RF
5213	2422 264 00525	Loudsp. 16Ω 10W FR
5214	2422 264 00525	Loudsp. 16Ω 10W FR

29PT5458/01

0601	Proc. Main SW	Download from website
0602	Proc. NVM SW	Download from website
1099▲	9301 984 90314	CRT A68ERF185X013/M
1116	3139 268 04861	Side I/O Assy [D]
1160	3139 188 50561	Keyboard Cntrl Assy [E]
8157	3104 311 07341	Cable 6p/340/6p Wh
8177	3104 311 03821	Cable 2p3/340/2p3 Bk
8206	3139 110 39021	Cable 7P 180mm
8207	3104 311 07301	Cable 7p/480/7p Wh
8278	3104 311 03391	Cable 4P 1000mm
8280	3104 301 08422	Wiring 5P480 Wh

⏦

5203▲	2422 549 01315	Coil degaus 29"RF
5213	2422 264 00476	Loudsp. 16Ω 10W FR
5214	2422 264 00476	Loudsp. 16Ω 10W FR

Mono Carrier [A]

Various

1000	3139 147 20911	Tuner UV1316E/A I-4
1001	2422 549 44341	SAW 38.9MHz K9656M
1002	4822 242 81436	SAW 38.9MHz K3953M
1005	4822 267 10748	Connector 3p
1204	4822 265 41113	Connector 7p
1205	2422 543 01421	Xtal 24.576MHz
1207	2422 025 11244	Connector 7p m
1280	4822 267 10734	Connector 5p
1282	3139 121 09143	Wire Fhook/140/Fhook
1401	4822 265 30735	Connector 5p
1404	4822 267 10966	Connector 2p
1451	2422 025 10646	Connector 2p m
1452▲	4822 071 51252	Fuse 1.25A
1454▲	4822 071 51252	Fuse 1.25A
1500▲	2422 086 10905	Fuse 4A
1500▲	2422 086 10914	Fuse 4A 250V
1501	2422 090 01101	Soc Fuse 1P Female
1502	2422 090 01101	Soc Fuse 1P Female
1503	2422 132 07467	Relay 1p 12V 5A LKS1AF
1504	4822 265 20723	Connector 2p
1505	4822 265 20723	Connector 2p
1506	2422 128 03111	Switch
1508	3139 131 03601	Wire Sin 180 Sin Bk
1510	3139 131 03611	Wire Sin 400 Sin Bk
1600	4822 276 13775	Switch 1p 0.1A 12V
1601	4822 276 13775	Switch 1p 0.1A 12V
1602	4822 276 13775	Switch 1p 0.1A 12V
1603	4822 276 13775	Switch 1p 0.1A 12V
1682	2422 025 16382	Connector 3p m
1684	3139 131 04162	Cable 3P 100mm
1693	2422 025 12482	Connector 6p m
1729	4822 267 10735	Connector 3p
1734	2422 026 05466	Soc cinch 2p
1735	4822 267 10771	Socket 2 x SCART
1763	3139 131 03952	Cable 280+140 SIN Bk
8198	3104 311 00171	Cable 2P 560
8199	3104 311 08561	Cable 2P 560
8204	3104 311 09011	Cable 7P/400/7P
8270	3139 121 09143	Wire Fhook/140/Fhook
8401	3139 121 09041	Cable 5p/560/5p

⊣⊢

2001	4822 122 33761	22pF 5% 50V
2002	4822 122 33761	22pF 5% 50V
2003	5322 126 11583	10nF 10% 50V 0603
2004	3198 024 44730	47nF 50V 0603
2005	4822 124 40769	4.7µF 20% 100V
2006	4822 124 80791	470µF 20% 16V
2007	2238 586 59812	100nF 20% 50V 0603
2008	2038 035 21307	68µ 25V
2203	4822 124 41584	100µF 20% 10V
2205	3198 017 42240	220nF 16V Y5V 0603
2206	3198 017 42240	220nF 16V Y5V 0603
2207	3198 017 42240	220nF 16V Y5V 0603
2208	3198 017 42240	220nF 16V Y5V 0603
2209	3198 017 42240	220nF 16V Y5V 0603
2210	3198 017 42240	220nF 16V Y5V 0603
2211	3198 017 42240	220nF 16V Y5V 0603
2212	3198 017 42240	220nF 16V Y5V 0603
2213	3198 017 42240	220nF 16V Y5V 0603
2214	2238 586 59812	100nF 20% 50V 0603
2215	3198 017 42240	220nF 16V Y5V 0603
2216	3198 017 42240	220nF 16V Y5V 0603
2217	4822 124 40207	100µF 20% 25V
2218	4822 124 40433	47µF 20% 25V
2222	2238 586 15633	5.6nF 50V
2223	2238 586 59812	100nF 20% 50V 0603
2224	4822 124 40207	100µF 20% 25V
2225	2020 552 00183	2.2µF 10% 6.3V 0603
2225	3198 017 42240	220nF 16V Y5V 0603
2226	2020 552 00183	2.2µF 10% 6.3V 0603
2226	3198 017 42240	220nF 16V Y5V 0603
2229	3198 017 42240	220nF 16V Y5V 0603
2230	4822 124 40248	10µF 20% 63V
2231	2238 586 59812	100nF 20% 50V 0603
2232	2238 586 59812	100nF 20% 50V 0603
2233	2238 586 59812	100nF 20% 50V 0603
2234	4822 124 40207	100µF 20% 25V
2235	5322 126 11582	6.8nF 10% 63V
2236	5322 126 11583	10nF 10% 50V 0603
2237	2238 586 59812	100nF 20% 50V 0603
2238	3198 017 42240	220nF 16V Y5V 0603
2238	4822 126 14076	220nF +80/-20% 25V
2239	3198 017 42240	220nF 16V Y5V 0603
2240	4822 124 41631	1.5µF 50V
2241	2238 916 15641	22nF 10% 25V 0603
2242	2238 586 59812	100nF 20% 50V 0603
2243	2238 586 59812	100nF 20% 50V 0603
2244	4822 126 14491	2.2µF 10V 0805
2245	3198 016 31020	1nF 25V 0603
2246	2238 586 59812	100nF 20% 50V 0603
2247	2238 586 59812	100nF 20% 50V 0603
2248	5322 122 31647	1nF 10% 63V
2249	2238 586 59812	100nF 20% 50V 0603
2250	4822 124 40207	100µF 20% 25V
2251	2022 318 00212	150nF 50V
2253	5322 126 11583	10nF 10% 50V 0603
2254	3198 017 34730	47nF 16V 0603
2255	5322 126 11583	10nF 10% 50V 0603
2256	2238 586 59812	100nF 20% 50V 0603
2257	5322 126 11579	3.3nF 10% 63V
2260	2238 586 59812	100nF 20% 50V 0603
2261	2238 586 59812	100nF 20% 50V 0603
2262	5322 126 11583	10nF 10% 50V 0603
2263	2238 586 59812	100nF 20% 50V 0603
2264	4822 126 14249	560pF 10% 50V 0603
2265	4822 124 40207	100µF 20% 25V
2266	4822 126 14491	2.2µF 10V 0805
2267	4822 126 14491	2.2µF 10V 0805
2270	5322 126 11578	1nF 10% 50V 0603
2271	5322 126 11578	1nF 10% 50V 0603
2272	2238 586 59812	100nF 20% 50V 0603
2273	4822 124 40207	100µF 20% 25V
2274	2238 586 59812	100nF 20% 50V 0603
2275	4822 124 40248	10µF 20% 63V
2276	4822 126 14585	100nF 10% 0805 50V
2279	2020 552 94427	100pF 5% 50V
2280	3198 017 41050	1µF 10V 0603
2282	5322 126 11578	1nF 10% 50V 0603
2288	5322 126 11578	1nF 10% 50V 0603
2289	5322 126 11578	1nF 10% 50V 0603
2290	2020 552 00183	2.2µF 10% 6.3V 0603
2290	3198 017 41050	1µF 10V 0603
2404	2038 035 13805	47µF 20% 160V
2406▲	4822 126 13185	680pF 10% 500V
2408	2020 552 94427	100pF 5% 50V
2409	2238 586 59812	100nF 20% 50V 0603
2410	4822 126 14043	1µF +80-20% 16V 0805
2411▲	4822 126 14237	470pF 10% 2kV
2412	4822 121 70663	13nF 5% 6V
2413	5322 121 44151	33nF 10% 400V
2414	3198 017 41050	1µF 10V 0603
2415	2022 031 00172	2.2µF 160V
2418	2222 479 90019	360nF 5% 250V
2418	4822 121 43888	360nF 5% 250V
2419	2222 468 90324	2.2µF 100V
2420	3198 017 41050	1µF 10V 0603
2425	3198 017 33330	33nF 20% 16V 0603
2427	4822 121 51305	15nF 10% 50V
2428	3198 017 33330	33nF 20% 16V 0603
2451	5322 121 42578	100nF 5% 250V
2454	4822 124 80791	470µF 20% 16V
2456	4822 117 11151	1Ω 5%
2457	2022 031 00137	4.7µF 20% 250V
2459▲	4822 122 31177	470pF 10% 500V
2460	2022 031 00139	470µF 20% 16V
2461	3198 016 31020	1nF 25V 0603
2462	3198 016 31020	1nF 25V 0603
2463	2020 021 91677	100µF 20% 50V
2464	4822 126 13881	470pF 5% 50V
2465	2020 022 00003	10µF 20% 100V
2465	2022 031 00493	10µF 20% 100V
2465	5322 124 40641	10µF 20% 100V
2467	4822 121 70162	10nF 5% 400V
2468	4822 126 13883	220pF 5% 50V
2469	3198 017 42240	220nF 16V Y5V 0603
2470	2222 601 55649	100nF 10% 100V 1206
2486	2252 508 08255	27pF 500V
2486	2252 562 14256	27P 10% 2KV
2487	5322 126 10465	3.9nF 10% 50V
2488	2020 557 00002	33pF 200V
2489	5322 126 11583	10nF 10% 50V 0603
2490	4822 117 11151	1Ω 5%
2500	2022 330 00053	470nF 20% 275V
2503▲	4822 126 12793	2.2nF 10% 2kV
2504▲	4822 126 12793	2.2nF 10% 2kV
2505	2022 020 01012	220µF 20% 400V
2508	2022 330 00049	100nF 20% 275V
2509	2022 554 04157	1.5nF 250V 20%
2511	4822 124 81151	22µF 50V
2512	2238 586 59812	100nF 20% 50V 0603
2513	4822 126 13881	470pF 5% 50V
2514▲	4822 126 13862	1.5nF 10% 2kV
2515	4822 126 13881	470pF 5% 50V
2516	2238 586 59812	100nF 20% 50V 0603
2517	5322 126 11578	1nF 10% 50V 0603
2519	2238 606 11536	100pF 5% 100V
2528	4822 121 51252	470nF 5% 63V
2530	2020 557 00005	330pF 100V
2531	4822 126 13881	470pF 5% 50V
2532	2020 552 96823	10µF 16V
2533	4822 126 13193	4.7nF 10% 63V
2534	2020 558 90261	68pF 1kV
2535	4822 124 40184	1000µF 20% 10V
2536	2020 012 93728	2200µF 20% 10V
2538	4822 126 13881	470pF 5% 50V
2539▲	4822 122 31177	470pF 10% 500V
2541	4822 124 40433	47µF 20% 25V
2542	2252 811 95021	1nF 10% 250V
2543▲	4822 126 10206	2.2nF 10% 500V
2549	2020 552 94427	100pF 5% 50V
2550	2020 557 00002	33pF 200V
2551▲	4822 126 13449	1nF 10% 2kV
2552	2022 031 00165	100µF 160V
2553	4822 126 14508	180pF 5% 50V 0603
2561▲	4822 122 31175	1nF 10% 500V
2562	4822 124 80061	1000µF 20% 25V
2563	4822 124 80061	1000µF 20% 25V
2564	4822 126 14585	100nF 10% 0805 50V
2565▲	4822 122 31175	1nF 10% 500V
2570	2020 554 90168	330pF 10% 250V
2570	2022 554 04155	470pF 20% 250V
2571	3198 017 31530	15nF 20% 50V 0603
2572	5322 126 11583	10nF 10% 50V 0603
2573	2020 552 96683	220nF 10% 50V
2601	3198 016 31020	1nF 25V 0603
2611	4822 124 40433	47µF 20% 25V
2617	2238 586 59812	100nF 20% 50V 0603
2620	2238 586 59812	100nF 20% 50V 0603
2621	4822 124 40207	100µF 20% 25V
2622	2020 552 96664	33pF 50V 0603
2623	2238 586 59812	100nF 20% 50V 0603
2624	4822 124 40207	100µF 20% 25V
2625	2020 552 00179	2µ2 10% 25V
2625	2022 552 05615	2.2µF 10% 6.3V 0805
2630	5322 126 11583	10nF 10% 50V 0603
2631	4822 124 41796	22µF 20% 16V

2691	4822 124 40196	220µF 20% 16V
2702	4822 126 14241	330pF 0603 50V
2703	4822 124 40248	10µF 20% 63V
2705	4822 126 14241	330pF 0603 50V
2706	4822 126 14491	2.2µF 10V 0805
2708	4822 126 14241	330pF 0603 50V
2709	4822 124 40248	10µF 20% 63V
2711	4822 126 14241	330pF 0603 50V
2712	4822 126 14491	2.2µF 10V 0805
2732	4822 126 14241	330pF 0603 50V
2733	4822 124 40248	10µF 20% 63V
2735	4822 126 14241	330pF 0603 50V
2736	3198 017 41050	1µF 10V 0603
2738	4822 126 14241	330pF 0603 50V
2739	4822 124 40248	10µF 20% 63V
2741	4822 126 14241	330pF 0603 50V
2742	3198 017 41050	1µF 10V 0603
2751	4822 126 14241	330pF 0603 50V
2752	4822 124 40248	10µF 20% 63V
2753	4822 126 14241	330pF 0603 50V
2754	4822 124 40248	10µF 20% 63V
2755	5322 126 11579	3.3nF 10% 63V
2756	5322 126 11579	3.3nF 10% 63V
2759	2020 552 96664	33pF 50V 0603
2760	2238 586 59812	100nF 20% 50V 0603
2917	3198 032 27190	100µF 6.3V
2985	4822 126 14508	180pF 5% 50V 0603
2986	2238 586 59812	100nF 20% 50V 0603
2987	2238 586 59812	100nF 20% 50V 0603
2988	2238 586 59812	100nF 20% 50V 0603
2989	3198 017 41050	1µF 10V 0603
2990	4822 126 14241	330pF 0603 50V
2991	4822 126 14508	180pF 5% 50V 0603
2992	3198 017 41050	1µF 10V 0603
2993	4822 126 14241	330pF 0603 50V
2994	2238 916 15641	22nF 10% 25V 0603
2995	2238 916 15641	22nF 10% 25V 0603
2996	3198 024 44730	47nF 50V 0603
2997	3198 024 44730	47nF 50V 0603

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3002	4822 051 30103	10kΩ 5% 0.062W
3003	4822 051 30223	22kΩ 5% 0.062W
3005	4822 051 30101	100Ω 5% 0.062W
3006	4822 051 30103	10kΩ 5% 0.062W
3007	4822 051 30222	2.2kΩ 5% 0.062W
3008	4822 051 30682	6.8Ω 5% 0.062W
3009	4822 051 30222	2.2kΩ 5% 0.062W
3201	4822 050 11002	1kΩ 1% 0.4W
3202	4822 051 30332	3.3Ω 5% 0.062W
3204	4822 051 30332	3.3Ω 5% 0.062W
3206	4822 051 30562	5.6kΩ 5% 0.063W 0603
3207	4822 051 30101	100Ω 5% 0.062W
3208	4822 051 30273	27kΩ 5% 0.062W
3209	3198 021 31080	1Ω 5% 0603
3210	3198 021 31080	1Ω 5% 0603
3211	4822 051 30273	27kΩ 5% 0.062W
3212	4822 051 30101	100Ω 5% 0.062W
3214	4822 051 30101	100Ω 5% 0.062W
3215	4822 116 52283	4.7kΩ 5% 0.5W
3216	4822 051 30109	10Ω 5% 0.062W
3217	4822 051 30103	10kΩ 5% 0.062W
3218	4822 051 30101	100Ω 5% 0.062W
3219	4822 051 30103	10kΩ 5% 0.062W
3220	4822 051 30272	2.7kΩ 5% 0.062W
3221	4822 051 30103	10kΩ 5% 0.062W
3222	4822 051 30331	330Ω 5% 0.062W
3224	4822 116 83874	220kΩ 5% 0.5W
3225	4822 051 30471	47Ω 5% 0.062W
3226	4822 051 30101	100Ω 5% 0.062W
3227	4822 051 30101	100Ω 5% 0.062W
3228	4822 051 30101	100Ω 5% 0.062W
3229	4822 051 30152	1.5Ω 5% 0.062W
3229	4822 051 30332	3.3Ω 5% 0.062W
3230	4822 116 52175	100Ω 5% 0.5W
3231	4822 116 52175	100Ω 5% 0.5W
3232	4822 051 30562	5.6kΩ 5% 0.063W 0603
3233	4822 051 30101	100Ω 5% 0.062W
3234	4822 116 52175	100Ω 5% 0.5W
3235	4822 051 30102	1kΩ 5% 0.062W
3236	4822 051 30101	100Ω 5% 0.062W
3237	4822 051 30102	1kΩ 5% 0.062W
3238	4822 051 30472	4.7Ω 5% 0.062W
3239	4822 116 52207	1.2kΩ 5% 0.5W
3240	4822 051 30223	22kΩ 5% 0.062W
3241	2120 101 90485	39kΩ
3244	4822 051 30101	100Ω 5% 0.062W
3247	4822 051 30391	390Ω 5% 0.062W
3248	4822 051 30101	100Ω 5% 0.062W
3249	4822 116 52175	100Ω 5% 0.5W
3250	4822 051 30222	2.2kΩ 5% 0.062W
3251	4822 051 30123	12kΩ 5% 0.1W
3253	4822 051 30101	100Ω 5% 0.062W
3255	4822 051 30101	100Ω 5% 0.062W
3256	4822 051 30101	100Ω 5% 0.062W
3257	4822 051 30101	100Ω 5% 0.062W
3258	4822 116 52175	100Ω 5% 0.5W
3260	4822 116 52175	100Ω 5% 0.5W
3261	4822 051 30472	4.7Ω 5% 0.062W
3262	4822 051 30101	100Ω 5% 0.062W
3263	4822 051 30101	100Ω 5% 0.062W
3267	4822 051 30101	100Ω 5% 0.062W
3269	4822 051 30101	100Ω 5% 0.062W
3270	4822 116 52219	330Ω 5% 0.5W
3272	4822 117 12968	820Ω 5% 0.62W
3274	4822 116 52175	100Ω 5% 0.5W
3275	4822 116 52175	100Ω 5% 0.5W
3276	4822 116 52175	100Ω 5% 0.5W
3277	4822 116 52175	100Ω 5% 0.5W
3278	4822 116 52175	100Ω 5% 0.5W
3282	4822 051 30472	4.7Ω 5% 0.062W
3283	4822 051 30472	4.7Ω 5% 0.062W
3284	4822 051 30472	4.7Ω 5% 0.062W
3287	4822 051 30101	100Ω 5% 0.062W
3289	4822 051 30101	100Ω 5% 0.062W
3291	4822 050 11002	1kΩ 1% 0.4W
3295	3198 021 38220	8.2kΩ 5% 0.062W 0603
3296	4822 051 30562	5.6kΩ 5% 0.063W 0603
3297	4822 051 30223	22kΩ 5% 0.062W
3298	4822 051 30101	100Ω 5% 0.062W
3401	4822 050 24703	47kΩ 1% 0.6W
3404	4822 117 11151	1Ω 5%
3412	4822 050 11002	1kΩ 1% 0.4W
3414	4822 053 11339	33Ω 5% 2W
3415	4822 116 52175	100Ω 5% 0.5W
3416	4822 051 30479	47Ω 5% 0.062W
3417	4822 053 11153	15kΩ 5% 2W
3418	4822 116 52175	100Ω 5% 0.5W
3420	4822 117 10833	10kΩ 1% 0.1W
3422	4822 117 11151	1Ω 5%
3423	4822 122 32542	47nF 10% 63V
3425	4822 050 21004	100kΩ 1% 0.6W
3427	4822 117 11449	2.2kΩ 5% 0.1W 0805
3428	4822 051 20332	2.3kΩ 5% 0.1W
3430	4822 053 20334	330kΩ 5% 0.25W
3431	4822 050 21003	10kΩ 1% 0.6W
3432	4822 053 11159	15Ω 5% 2W
3433	4822 050 21008	1Ω 1% 0,6W
3434	4822 050 21008	1Ω 1% 0,6W
3440	4822 116 52226	560Ω 5% 0.5W
3441	4822 053 20334	330kΩ 5% 0.25W
3442	3198 036 90010	Wire 0.58mm
3443	3198 036 90010	Wire 0.58mm
3445	4822 051 20479	47Ω 5% 0.1W
3446	4822 051 30101	100Ω 5% 0.062W
3446	4822 051 30479	47Ω 5% 0.062W
3451	2312 915 16803	68kΩ 1% 0.5W
3452	4822 051 30563	56kΩ 5% 0.062W
3453	4822 051 30153	15kΩ 5% 0.062W
3454	4822 116 83884	47kΩ 5% 0.5W
3456	4822 117 11151	1Ω 5%
3458	4822 052 11478	4.7Ω 5% 0.5W
3460	4822 116 52256	2.2kΩ 5% 0.5W
3461	4822 116 52256	2.2kΩ 5% 0.5W
3462	4822 051 30222	2.2kΩ 5% 0.062W
3463	4822 051 30102	1kΩ 5% 0.062W
3464	4822 051 20391	390Ω 5% 0.1W
3465	4822 051 20391	390Ω 5% 0.1W
3466	4822 052 11108	1Ω 5% 0.5W
3467	4822 116 83872	220Ω 5% 0.5W
3468	4822 116 83872	220Ω 5% 0.5W
3469	4822 051 30102	1kΩ 5% 0.062W
3470	4822 116 52186	22Ω 5% 0.5W
3471	4822 050 22208	2.2Ω 1% 0,6W
3472	4822 050 22208	2.2Ω 1% 0,6W
3473	4822 051 30105	1MΩ 5% 0.062W
3474	4822 051 30153	15kΩ 5% 0.062W
3475	3198 021 38220	8.2kΩ 5% 0.062W 0603
3475	4822 051 30682	6.8Ω 5% 0.062W
3484	4822 052 10108	1Ω 5% 0.33W
3485	4822 052 10108	1Ω 5% 0.33W
3489	4822 051 20479	47Ω 5% 0.1W
3490	4822 117 12891	220kΩ 1%
3491	4822 051 30334	330kΩ 5% 0.062W
3495	4822 051 20334	330kΩ 5% 0.1W
3497	4822 052 11338	3.3Ω 5% 0,5W
3498	4822 051 30472	4.7Ω 5% 0.062W
3499	4822 051 20684	680kΩ 5% 0.1W
3500	4822 053 21335	3.3MΩ 5% 0.5W
3501	4822 053 21335	3.3MΩ 5% 0.5W
3502	4822 116 83872	220Ω 5% 0.5W
3503	4822 252 11215	DSP301N-A21F
3504	4822 053 21155	1.5MΩ 5% 0.5W
3505	2122 550 00171	1mΩ 612V
3506	4822 053 21335	3.3MΩ 5% 0.5W
3510	2122 612 00055	4.7Ω 3W
3511	4822 050 24708	4.7Ω 1% 0.6W
3512	4822 117 11817	1.2kΩ 1% 0.0625W
3513	4822 052 10222	2.2kΩ 5% 0.33W
3514	4822 052 10479	47Ω 5% 0.33W
3515	4822 050 11002	1kΩ 1% 0.4W
3516	4822 116 83303	0.1Ω 2W
3517	2322 704 63004	300KΩ
3518	4822 051 30332	3.3Ω 5% 0.062W
3519	4822 116 52244	15kΩ 5% 0.5W
3520	4822 117 11342	0.33Ω 5% 2W
3521	4822 116 52269	3.3kΩ 5% 0.5W
3522	4822 051 30563	56kΩ 5% 0.062W
3523	2122 663 00018	4.7Ω 20%
3524	4822 117 12925	47kΩ 1% 0.063W 0603
3527	4822 117 12925	47kΩ 1% 0.063W 0603
3528	4822 051 20105	1MΩ 5% 0.1W
3529	4822 053 20225	2.2MΩ 5% 0.25W
3530	4822 051 30221	220Ω 5% 0.062W
3531	4822 116 52234	100kΩ 5% 0.5W
3532	4822 052 10478	4.7Ω 5% 0.33W
3533	3198 021 38220	8.2kΩ 5% 0.062W 0603
3534	4822 116 52175	100Ω 5% 0.5W
3537	4822 051 30222	2.2kΩ 5% 0.062W
3538	4822 051 20188	1.8Ω 5% 0.1W
3541	4822 117 12925	47kΩ 1% 0.063W 0603
3563	4822 116 83872	220Ω 5% 0.5W
3565	4822 051 30153	15kΩ 5% 0.062W
3571	4822 116 83872	220Ω 5% 0.5W
3572	4822 051 30221	220Ω 5% 0.062W
3573	4822 051 30153	15kΩ 5% 0.062W
3574	4822 116 52245	150kΩ 5% 0.5W
3575	4822 050 28203	82kΩ 1% 0.6W
3576	5322 117 13026	4.7kΩ 1% 0.063W 0603
3577	4822 116 52243	1.5kΩ 5% 0.5W
3578	4822 051 30471	47Ω 5% 0.062W
3579	4822 051 30222	2.2kΩ 5% 0.062W
3601	4822 051 30472	4.7Ω 5% 0.062W
3604	4822 051 30101	100Ω 5% 0.062W
3605	4822 051 30101	100Ω 5% 0.062W
3606	4822 116 52291	56kΩ 5% 0.5W
3607	4822 051 30103	10kΩ 5% 0.062W
3608	4822 051 30273	27kΩ 5% 0.062W
3609	4822 051 30331	330Ω 5% 0.062W
3614	4822 051 30101	100Ω 5% 0.062W
3616	4822 116 52175	100Ω 5% 0.5W
3617	4822 116 52175	100Ω 5% 0.5W
3618	4822 116 52175	100Ω 5% 0.5W
3634	4822 051 30102	1kΩ 5% 0.062W
3635	4822 117 12925	47kΩ 1% 0.063W 0603
3637	4822 051 30479	47Ω 5% 0.062W
3639	4822 116 52186	22Ω 5% 0.5W
3681	5322 117 13057	820Ω 1% 0.063W 0603
3684	5322 117 13036	1.2kΩ 1% 0.063W 0603
3685	4822 051 30151	150Ω 5% 0.062W
3686	4822 051 30391	390Ω 5% 0.062W
3687	5322 117 13046	1.8kΩ 1% 0.063W 0603
3690	4822 051 30221	220Ω 5% 0.062W
3691	4822 117 11817	1.2kΩ 1% 0.0625W
3692	4822 051 30272	2.7kΩ 5% 0.062W
3693	4822 051 30221	220Ω 5% 0.062W
3694	4822 051 30472	4.7Ω 5% 0.062W
3701	4822 116 83868	150Ω 5% 0.5W
3702	4822 117 12891	220kΩ 1%
3703	4822 116 52303	8.2kΩ 5% 0.5W
3704	4822 051 30123	12kΩ 5% 0.1W
3705	4822 116 83868	150Ω 5% 0.5W
3706	4822 117 12891	220kΩ 1%
3707	4822 116 52303	8.2kΩ 5% 0.5W
3708	4822 051 30123	12kΩ 5% 0.1W
3709	4822 116 52201	75Ω 5% 0.5W
3711	4822 051 30333	33kΩ 5% 0.062W
3712	4822 051 30682	6.8Ω 5% 0.062W
3713	4822 116 52201	75Ω 5% 0.5W
3715	4822 116 52201	75Ω 5% 0.5W
3717	4822 116 52201	75Ω 5% 0.5W
3718	4822 116 52219	330Ω 5% 0.5W
3719	4822 051 30689	68Ω 5% 0.063W 0603
3720	4822 051 30102	1kΩ 5% 0.062W
3721	4822 116 52201	75Ω 5% 0.5W
3731	4822 116 83868	150Ω 5% 0.5W
3732	4822 117 12891	220kΩ 1%
3733	4822 116 52303	8.2kΩ 5% 0.5W
3734	4822 051 30123	12kΩ 5% 0.1W
3735	4822 116 83868	150Ω 5% 0.5W
3736	4822 117 12891	220kΩ 1%
3737	4822 116 52303	8.2kΩ 5% 0.5W
3738	4822 051 30123	12kΩ 5% 0.1W
3739	4822 050 23303	33kΩ 1% 0.6W
3740	4822 051 30682	6.8Ω 5% 0.062W
3741	4822 116 52201	75Ω 5% 0.5W
3743	4822 116 52199	68Ω 5% 0.5W
3745	4822 116 52201	75Ω 5% 0.5W
3751	4822 116 83868	150Ω 5% 0.5W
3752	4822 117 12891	220kΩ 1%

3753	4822 116 83868	150Ω 5% 0.5W
3754	4822 117 12891	220kΩ 1%
3758	4822 116 52195	47Ω 5% 0.5W
3767	4822 117 11817	1.2kΩ 1% 0.0625W
3769	4822 117 11817	1.2kΩ 1% 0.0625W
3975	4822 053 11101	100Ω 5% 2W
3985	4822 051 30563	56kΩ 5% 0.062W
3988	4822 051 30103	10kΩ 5% 0.062W
3989	4822 051 30109	10Ω 5% 0.062W
3991	4822 051 30563	56kΩ 5% 0.062W
3992	4822 051 30103	10kΩ 5% 0.062W
3993	4822 051 30109	10Ω 5% 0.062W
3994	4822 051 30683	68kΩ 5% 0.062W
3995	4822 051 30472	4.7Ω 5% 0.062W
3996	4822 051 30682	6.8Ω 5% 0.062W
3997	4822 117 13632	100kΩ 1% 0603 0.62W
3998	4822 051 30103	10kΩ 5% 0.062W
4000	4822 051 30008	Jumper 0603
4001	4822 051 30008	Jumper 0603
4002	4822 051 30008	Jumper 0603
4011	4822 051 30008	Jumper 0603
4013	4822 051 30008	Jumper 0603
4015	4822 051 30008	Jumper 0603
4207	4822 051 30008	Jumper 0603
4209	4822 051 30008	Jumper 0603
4212	4822 051 30008	Jumper 0603
4221	4822 051 30008	Jumper 0603
4222	4822 051 30008	Jumper 0603
4223	4822 051 20008	Jumper 0805
4226	4822 051 30008	Jumper 0603
4227	4822 051 30008	Jumper 0603
4240	4822 051 30008	Jumper 0603
4241	4822 051 30008	Jumper 0603
4437	4822 051 30008	Jumper 0603
4470	4822 051 30008	Jumper 0603
4471	4822 051 30008	Jumper 0603
4472	4822 051 30008	Jumper 0603
4473	4822 051 30008	Jumper 0603
4474	4822 051 30008	Jumper 0603
4492	4822 051 30008	Jumper 0603
4533	4822 051 20008	Jumper 0805
4534	4822 051 30008	Jumper 0603
4535	4822 051 30008	Jumper 0603
4537	4822 051 30008	Jumper 0603
4581	4822 051 20008	Jumper 0805
4602	4822 051 30008	Jumper 0603
4604	4822 051 30008	Jumper 0603
4610	4822 051 30008	Jumper 0603
4612	4822 051 20008	Jumper 0805
4620	4822 051 30008	Jumper 0603
4631	4822 051 30008	Jumper 0603
4635	4822 051 30008	Jumper 0603
4637	4822 051 30008	Jumper 0603
4642	4822 051 30008	Jumper 0603
4644	4822 051 20008	Jumper 0805
4645	4822 051 30008	Jumper 0603
4646	4822 051 30008	Jumper 0603
4648	4822 051 30008	Jumper 0603
4649	4822 051 30008	Jumper 0603
4691	4822 051 30008	Jumper 0603
4692	4822 051 30008	Jumper 0603
4694	4822 051 30008	Jumper 0603
4696	4822 051 30008	Jumper 0603
4730	4822 051 30008	Jumper 0603
4910	4822 051 30008	Jumper 0603
4914	4822 051 20008	Jumper 0805
4915	4822 051 20008	Jumper 0805
4916	4822 051 20008	Jumper 0805
4917	4822 051 20008	Jumper 0805
4921	4822 051 20008	Jumper 0805
4992	4822 051 20008	Jumper 0805
9202	3198 036 90010	Wire 0.58mm
9203	3198 036 90010	Wire 0.58mm
9205	3198 036 90010	Wire 0.58mm
9206	3198 036 90010	Wire 0.58mm
9207	3198 036 90010	Wire 0.58mm
9208	3198 036 90010	Wire 0.58mm
9209	3198 036 90010	Wire 0.58mm
9210	3198 036 90010	Wire 0.58mm
9211	3198 036 90010	Wire 0.58mm
9212	3198 036 90010	Wire 0.58mm
9213	3198 036 90010	Wire 0.58mm
9214	3198 036 90010	Wire 0.58mm
9216	3198 036 90010	Wire 0.58mm
9217	3198 036 90010	Wire 0.58mm
9218	3198 036 90010	Wire 0.58mm
9219	3198 036 90010	Wire 0.58mm
9220	3198 036 90010	Wire 0.58mm
9221	3198 018 11280	1.2µH 5%
9222	3198 036 90010	Wire 0.58mm
9223	3198 036 90010	Wire 0.58mm
9224	3198 036 90010	Wire 0.58mm
9225	3198 036 90010	Wire 0.58mm
9226	3198 036 90010	Wire 0.58mm
9227	3198 036 90010	Wire 0.58mm
9228	3198 036 90010	Wire 0.58mm
9229	3198 036 90010	Wire 0.58mm
9230	3198 036 90010	Wire 0.58mm
9231	3198 036 90010	Wire 0.58mm
9232	3198 036 90010	Wire 0.58mm
9233	3198 036 90010	Wire 0.58mm
9234	3198 036 90010	Wire 0.58mm
9236	3198 036 90010	Wire 0.58mm
9237	3198 036 90010	Wire 0.58mm
9238	3198 036 90010	Wire 0.58mm
9239	3198 036 90010	Wire 0.58mm
9240	3198 036 90010	Wire 0.58mm
9241	3198 036 90010	Wire 0.58mm
9244	3198 036 90010	Wire 0.58mm
9245	3198 036 90010	Wire 0.58mm
9246	3198 036 90010	Wire 0.58mm
9247	3198 036 90010	Wire 0.58mm
9248	3198 036 90010	Wire 0.58mm
9249	3198 036 90010	Wire 0.58mm
9250	3198 036 90010	Wire 0.58mm
9251	3198 036 90010	Wire 0.58mm
9252	3198 036 90010	Wire 0.58mm
9253	3198 036 90010	Wire 0.58mm
9254	3198 036 90010	Wire 0.58mm
9255	3198 036 90010	Wire 0.58mm
9258	3198 036 90010	Wire 0.58mm
9259	3198 036 90010	Wire 0.58mm
9263	3198 036 90010	Wire 0.58mm
9264	3198 036 90010	Wire 0.58mm
9268	3198 036 90010	Wire 0.58mm
9269	3198 036 90010	Wire 0.58mm
9271	3198 036 90010	Wire 0.58mm
9272	3198 036 90010	Wire 0.58mm
9273	3198 036 90010	Wire 0.58mm
9274	3198 036 90010	Wire 0.58mm
9275	3198 036 90010	Wire 0.58mm
9276	3198 036 90010	Wire 0.58mm
9277	3198 036 90010	Wire 0.58mm
9278	3198 036 90010	Wire 0.58mm
9279	3198 036 90010	Wire 0.58mm
9280	3198 036 90010	Wire 0.58mm
9290	3198 036 90010	Wire 0.58mm
9294	3198 036 90010	Wire 0.58mm
9296	3198 036 90010	Wire 0.58mm
9297	3198 036 90010	Wire 0.58mm
9298	3198 036 90010	Wire 0.58mm
9299	3198 036 90010	Wire 0.58mm
9401	3198 036 90010	Wire 0.58mm
9404	3198 036 90010	Wire 0.58mm
9407	3198 036 90010	Wire 0.58mm
9452	3198 036 90010	Wire 0.58mm
9460	3198 036 90010	Wire 0.58mm
9466	3198 036 90010	Wire 0.58mm
9467	3198 036 90010	Wire 0.58mm
9469	3198 036 90010	Wire 0.58mm
9470	3198 036 90010	Wire 0.58mm
9473	3198 036 90010	Wire 0.58mm
9474	3198 036 90010	Wire 0.58mm
9475	3198 036 90010	Wire 0.58mm
9476	3198 036 90010	Wire 0.58mm
9477	3198 036 90010	Wire 0.58mm
9478	3198 036 90010	Wire 0.58mm
9479	3198 036 90010	Wire 0.58mm
9480	3198 036 90010	Wire 0.58mm
9481	3198 036 90010	Wire 0.58mm
9482	3198 036 90010	Wire 0.58mm
9483	3198 036 90010	Wire 0.58mm
9484	3198 036 90010	Wire 0.58mm
9485	3198 036 90010	Wire 0.58mm
9486	3198 036 90010	Wire 0.58mm
9487	3198 036 90010	Wire 0.58mm
9488	3198 036 90010	Wire 0.58mm
9489	3198 036 90010	Wire 0.58mm
9490	3198 036 90010	Wire 0.58mm
9491	3198 036 90010	Wire 0.58mm
9492	3198 036 90010	Wire 0.58mm
9505	3198 036 90010	Wire 0.58mm
9506	3198 036 90010	Wire 0.58mm
9509	3198 036 90010	Wire 0.58mm
9510	3198 036 90010	Wire 0.58mm
9536	3198 036 90010	Wire 0.58mm
9537	3198 036 90010	Wire 0.58mm
9570	3198 036 90010	Wire 0.58mm
9573	3198 036 90010	Wire 0.58mm
9574	3198 036 90010	Wire 0.58mm
9575	3198 036 90010	Wire 0.58mm
9576	3198 036 90010	Wire 0.58mm
9577	3198 036 90010	Wire 0.58mm
9582	3198 036 90010	Wire 0.58mm
9583	3198 036 90010	Wire 0.58mm
9584	3198 036 90010	Wire 0.58mm
9585	3198 036 90010	Wire 0.58mm
9586	3198 036 90010	Wire 0.58mm
9587	3198 036 90010	Wire 0.58mm
9589	3198 036 90010	Wire 0.58mm
9590	3198 036 90010	Wire 0.58mm
9603	3198 036 90010	Wire 0.58mm
9605	3198 036 90010	Wire 0.58mm
9695	3198 036 90010	Wire 0.58mm

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5001	2422 549 42896	Bead 120Ω 100MHz
5002	3198 018 34770	0.47µH 10% 0805
5201	4822 526 10704	Bead 50 Ω at 100MHz
5202	2422 549 42896	Bead 120Ω 100MHz
5203	2422 549 42896	Bead 120Ω 100MHz
5205	2422 549 42896	Bead 120Ω 100MHz
5206	2422 549 42896	Bead 120Ω 100MHz
5206	2422 549 44393	Bead 2.7kΩ at 100MHz
5207	2422 549 42896	Bead 120Ω 100MHz
5207	2422 549 44393	Bead 2.7kΩ at 100MHz
5208	4822 526 10704	Bead 50 Ω at 100MHz
5209	2422 549 42896	Bead 120Ω 100MHz
5210	2422 549 42896	Bead 120Ω 100MHz
5211	2422 549 42896	Bead 120Ω 100MHz
5212	2422 549 42896	Bead 120Ω 100MHz
5213	2422 549 42896	Bead 120Ω 100MHz
5214	2422 549 42896	Bead 120Ω 100MHz
5215	2422 549 42896	Bead 120Ω 100MHz
5216	4822 526 10704	Bead 50 Ω at 100MHz
5217	4822 157 11835	4,7µH 5%
5220	2422 549 44393	Bead 2.7kΩ at 100MHz
5295	4822 526 10704	Bead 50 Ω at 100MHz
5296	2422 549 44393	Bead 2.7kΩ at 100MHz
5401	2422 535 91028	Linearity coil 25µH
5401	2422 535 91033	38µH
5402	2422 531 00101	JDT1103
5405	2422 536 00846	SC15334-00 B
5408	4822 157 11711	Choke coil
5410	4822 157 11737	22µH 10%
5450	2422 531 98047	1362.0016A
5451	5322 157 51687	39µH
5500	4822 157 10476	DMF-2820H
5501	4822 157 11523	Line filter 5mH/2A
5511	4822 526 10704	Bead 50 Ω at 100MHz
5512	2422 531 02634	SS42315-01 B
5531	2422 531 02631	SS22220-03 B
5551	4822 526 10704	Bead 50 Ω at 100MHz
5552	4822 157 71401	27µH
5561	4822 526 10704	Bead 50 Ω at 100MHz
5562	4822 526 10704	Bead 50 Ω at 100MHz
5602	4822 157 11835	4,7µH 5%

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6001	4822 130 34142	BZX79-B33
6003	4822 130 11397	BAS316
6004	4822 130 11525	1SS356
6006	4822 130 34382	BZX79-B8V2
6203	4822 130 11397	BAS316
6204	9322 128 70685	SMSS14
6205	9340 548 69115	PDZ27B
6209	4822 130 80622	BAT54
6210	3198 020 55680	BZX384-C5V6
6211	3198 020 55680	BZX384-C5V6
6403	5322 130 31938	BYV27-200
6404	9322 221 54687	DMV1500SDFD
6406	9334 939 60673	RGP10G
6407	9322 197 45703	BAV21WS
6407	9322 243 89685	BAV21WS-V
6408	9322 197 45703	BAV21WS
6408	9322 243 89685	BAV21WS-V
6410	5322 130 31559	BY448
6441	9322 150 20685	BZX384-C68
6442	9322 150 20685	BZX384-C68
6443	4822 130 11551	UDZS10B
6450	4822 130 11397	BAS316
6451	4822 130 11148	UDZ4.7B
6452	5322 130 31938	BYV27-200
6453	9334 939 60673	RGP10G
6454	9334 939 60673	RGP10G
6455	9334 939 60673	RGP10G
6456	4822 130 11572	STPS8H100F
6457	4822 130 11397	BAS316
6458	4822 130 11397	BAS316
6459	9334 939 60673	RGP10G
6482	4822 130 11416	PDZ6.8B
6483	9322 197 45703	BAV21WS
6483	9322 243 89685	BAV21WS-V
6484	9322 197 45703	BAV21WS
6484	9322 243 89685	BAV21WS-V
6486	4822 130 30842	BAV21
6488	4822 130 11397	BAS316
6489	9340 548 71115	PDZ33B

6500	3198 010 10640	Bridge cell GBU4K
6511	4822 130 31607	RGP10D
6512	4822 130 80622	BAT54
6514	4822 130 11397	BAS316
6531	4822 130 11522	UDZ15B
6532	9322 197 45703	BAV21WS
6532	9322 243 89685	BAV21WS-V
6533	9322 171 80685	BZX384-B6V8
6534	9322 199 75685	BZX384-B3V9
6535	9322 238 52673	SR106
6535	9965 000 31718	SB160
6536	9322 198 25673	SB180
6536	9322 243 94673	SR108
6538	4822 130 11397	BAS316
6541	9322 129 41685	BZM55-C12
6551	9322 198 41687	STTH8L06D
6562	9322 161 78682	SB360L-7024
6563	9322 161 78682	SB360L-7024
6564	4822 130 11397	BAS316
6565	4822 130 11551	UDZS10B
6566	4822 130 11397	BAS316
6571	5322 130 34331	BAV70
6572	9340 548 54115	PDZ6.2B
6573	4822 130 30862	BZX79-B9V1
6575	4822 130 31878	1N4003G
6602	5322 130 34337	BAV99
6611	9340 548 71115	PDZ33B
6612	9340 548 71115	PDZ33B
6613	9340 548 71115	PDZ33B
6691	9322 050 99682	LTL-10224WHCR
6692	9322 206 78667	TSOP34836UH1B
6694	9340 548 52115	PDZ5.1B
6733	3198 020 55680	BZX384-C5V6
6990	4822 130 11397	BAS316

7001	4822 130 63732	MMUN2212
7200		For SW see item 0601
7200	9352 811 67557	TDA12020H1/N1F90
7201	4822 130 62343	IMX1
7202	4822 130 11155	PDTC114ET
7203	4822 130 41246	BC327-25
7204	4822 130 41246	BC327-25
7404	9340 547 13215	BSH103
7405	9340 497 50127	BU2725DX
7406	9322 224 86676	2SC5174
7408	5322 130 60159	BC846B
7410	4822 130 60373	BC856B
7411	4822 130 60373	BC856B
7451	9322 195 14687	KTD600KY
7452	9322 224 86676	2SC5174
7453	9322 195 05687	KTB631KY
7454	5322 130 60159	BC846B
7455	4822 130 60373	BC856B
7456	4822 130 60373	BC856B
7482	3198 010 44010	PDTA114ET
7483	4822 130 60373	BC856B
7484	5322 130 60159	BC846B
7511	9352 720 43118	TEA1506T/N1
7512	9322 174 27687	FQPF7N80
7513	8238 274 02070	TCET1103G
7514	5322 130 60159	BC846B
7531	9352 739 52112	TEA1620p/N1
7532	4822 130 60373	BC856B
7541	4822 130 60373	BC856B
7561	9340 547 00215	PDTC143ZT
7571	4822 130 40959	BC547B
7573	4822 130 11155	PDTC114ET
7601		For SW see item 0602
7603	4822 209 16978	LF33CV
7604	5322 130 60159	BC846B
7605	4822 130 41246	BC327-25
7606	5322 130 60159	BC846B
7701	5322 130 60159	BC846B
7702	5322 130 60159	BC846B
7703	5322 130 60159	BC846B
7705	9322 058 40685	SM IMT 1A
7706	5322 130 60159	BC846B
7707	5322 130 60159	BC846B
7708	5322 130 60159	BC846B
7709	5322 130 60159	BC846B
7990	4822 209 32641	TDA2616Q
7991	5322 130 60159	BC846B
7992	5322 130 60159	BC846B
7993	5322 130 60159	BC846B
7994	5322 130 60159	BC846B

CRT Panel [B]

Various

1254	2422 500 80086	Soc CRT 12P Female
1331	4822 265 41113	Connector 7p
1332	3104 301 08281	Connector 1p
1351	4822 265 30735	Connector 5p

2330	4822 121 40518	100nF 10% 250V
2331	5322 126 11583	10nF 10% 50V 0603
2332	2020 558 90621	10nF 630V
2333	5322 126 11578	1nF 10% 50V 0603
2334	2020 558 90621	10nF 630V
2335	2020 557 90742	22nF 10% 250V
2351	2038 031 92009	10µF 250V
2353▲	4822 126 14505	4.7nF 10% 2KV

3328	4822 051 30221	220Ω 5% 0.062W
3329	4822 051 30221	220Ω 5% 0.062W
3330	4822 051 30221	220Ω 5% 0.062W
3331	4822 116 52175	100Ω 5% 0.5W
3332	3198 013 01020	1kΩ 20% 0.5W
3333	4822 116 52175	100Ω 5% 0.5W
3334	3198 013 01020	1kΩ 20% 0.5W
3335	4822 116 52175	100Ω 5% 0.5W
3336	3198 013 01020	1kΩ 20% 0.5W
3351	4822 052 10101	100Ω 5% 0.33W
3354	3198 013 01520	1.5kΩ 20% 0.5W
3356	4822 050 21009	10Ω 1% 0.6W
3357	2122 552 00004	1mA 18V 0603
4336	4822 051 20008	Jumper 0805
4337	4822 051 30008	Jumper 0603
9390	3198 036 90010	Wire 0.58mm

5330	4822 526 10704	Bead 50 Ω at 100MHz
5351	4822 157 50961	22µH
5352	2422 535 94257	0.22 µF

6331	4822 130 30842	BAV21
6332	4822 130 30842	BAV21
6333	4822 130 30842	BAV21

7330	9352 753 84112	TDA6108AJF/N2

Side I/O Panel [D]

Various

1232	2422 026 05701	Socket Phone 1p f
1232	4822 267 51391	Connector Phone
1250	2422 026 05742	Socket Cinch 3p
1252	2422 025 11244	Connector 7p m
1254	4822 267 10734	Connector 5p
1278	4822 267 10565	Connector 4p

2171	4822 126 13512	330pF 10% 50V
2172	4822 126 13512	330pF 10% 50V
2173	4822 126 13512	330pF 10% 50V
2174	4822 126 13512	330pF 10% 50V
2175	4822 124 22652	2.2µF 20% 50V
2176	2238 586 59812	100nF 20% 50V 0603
2178	4822 126 13881	470pF 5% 50V
2180	4822 124 22652	2.2µF 20% 50V

3150	4822 116 83884	47kΩ 5% 0.5W
3151	4822 116 52257	22kΩ 5% 0.5W
3152	4822 116 83884	47kΩ 5% 0.5W
3153	4822 116 52257	22kΩ 5% 0.5W
3154	4822 116 52201	75Ω 5% 0.5W
3156	4822 116 52231	820Ω 5% 0.5W
3157	4822 116 52231	820Ω 5% 0.5W
3160	4822 116 52175	100Ω 5% 0.5W
9181	3198 036 90010	Wire 0.58mm

6162	9340 548 71115	PDZ33B
6163	9340 548 71115	PDZ33B
6164	9340 548 71115	PDZ33B
6165	9340 548 71115	PDZ33B

Keyboard Control Board [E]

Various

1100	4822 276 13775	Switch 1p 0.1A 12V
1101	4822 276 13775	Switch 1p 0.1A 12V
1102	4822 276 13775	Switch 1p 0.1A 12V
1103	4822 276 13775	Switch 1p 0.1A 12V
1108	2422 025 16268	Connector 2p m
1110	2422 128 03111	Switch
1505	2422 025 16268	Connector 2p m
1693	2422 025 10738	Connector 6p m

2101	4822 124 12379	220µF 25V
2103	5322 121 42386	100nF 5% 63V

3100	4822 053 21335	3.3MΩ 5% 0.5W
3101	4822 053 21335	3.3MΩ 5% 0.5W
3102	4822 116 52231	820Ω 5% 0.5W
3105	2312 915 11202	1.2kΩ 1% 0.5W
3106	4822 050 21501	150Ω 1% 0,6W
3107	3198 039 39010	390Ω 1%
3108	4822 050 21802	1K80 1% 0,6W
3111	4822 116 52207	1.2kΩ 5% 0.5W
3112	4822 116 83872	220Ω 5% 0.5W
3113	4822 116 52283	4.7kΩ 5% 0.5W

6101	9322 050 99682	LTL-10224WHCR
6102	9322 206 78667	TSOP34836UH1B

11. Revision List

11.1 Manual xxxx xxx xxxxx.0

- First release. (L04E-AE = Hercules 10.4)